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THE
PSYCHOLOGICAL BULLETIN

THE GALVANIC SKIN REFLEX (SWEATING) AND BLOOD-PRESSURE AS PREPARATORY AND FACILITATIVE FUNCTIONS[1]

BY CHESTER W. DARROW
Institute for Juvenile Research, Chicago

Many of the physiological changes in the organism are primarily preparatory and facilitative. They are preparatory in the sense that they occur in anticipation of activity that has yet to occur. They may be facilitative in the sense that their function is to render possible or more proficient other bodily activities. Salivary and gastric secretions on presentation of food, sexual changes induced by ideational stimuli, and postural tonus changes in anticipation of demand for action are among the more familiar phenomena of this type. There are 2 bodily changes, the palmar galvanic skin reflex and blood-pressure, which belong in this general class of preparatory and facilitative reactions and which are of considerable significance not only on their own account but because of what they may indicate of the more general preparedness and readiness for response on the part of the entire organism. Marked increase in blood pressure, as has been shown by Cannon (112) and by Bard (1), is an aspect of the body's "mobilization of energy"[2] for extreme emergency response. Palmar sweating or the palmar galvanic skin reflex, we shall attempt to show, is also a mechanism of preparedness and one that is especially valuable as an indicator at the more moderate levels of "adaptive mobilization".

Facilitative Character of Palmar Sweating. The galvanic skin

[1] Studies from the Institute for Juvenile Research, Chicago, Dr. Paul L. Schroeder, Director, Series C, No. 261.

[2] Bard (1) applies the term "mobilization of energy" to blood-pressure and other sympathetic manifestations of a preparatory and facilitative character.

reflex, when measured as conductance, is primarily an indication of the rate of sweat secretion by the skin.[3] Such a galvanic index of cutaneous secretory activity is of interest in itself because of need for a ready measure of varying perspiration in many forms of physiological and clinical investigation. But the measure is of even greater interest because of the special functional and psychological significance of perspiration in different skin areas (**4, 6**). Differences in the rate of sweating of various areas are so marked that they may be presumed to have a significance. For example, the fact that the palms of a person with intact nervous system tend to be dry in restful (relaxed?) sleep even though the body may be warm and perspiring elsewhere is readily verified by direct observation. It is also easily shown that as a person becomes sleepy the palms also tend to be dry, whereas they become more moist in a healthy person when he is in a wide awake, alert condition.[4] And if he becomes truly apprehensive or anxious about something the palms may become quite damp.[5] Obviously this perspiration is not primarily for the purpose of keeping the body cool. If that were the case the palms would hardly be dry in sleep regardless of the body temperature, nor would the hands frequently be found moist even when the body as a whole is cool and dry. In general it may be said that it is only when the subject is already aroused and when there is already elimination of excess heat by non-palmar sweating that we find a degree of parallelism between the reactions of palmar and non-palmar, non-plantar skin areas.

[3] The amount of perspiration secreted per second on palmar surfaces varies as the reciprocal of the resistance or as conductance (**2, 3**). The physical necessity or convenience of using resistance as a measure has apparently loaded with artifact our most common index of galvanic activity. This must be taken into account in the interpretation of available data from the literature. So long as resistance level remains uniform the unit of measure a worker has used may make little difference. But when resistance level varies throughout a wide range it must be kept in mind that large deflections or resistance changes at high resistance may mean very little change in physiological activity, whereas small resistance changes (or deflections when current is kept constant) at low resistance may mean very great changes in activity. The use of the reciprocal of resistance or conductance as a measure prevents this distortion of results.

[4] See references **18–31** which follow. By sleepiness is not meant fatigue. A person may be physically exhausted but highly alert, even "keyed up".

[5] When the hands are warm and the air is dry, the actual amount of perspiration given off may not, of course, be judged from the accumulation on the hands. Certain inhibitory effects in excitement, apparently attributable to adrenal secretion and vasoconstriction changes are discussed later.

To understand these striking observations we must find still another possible service of sweat upon the hands and feet. An explanation is suggested in the behavior of the workman who spits upon his hands to obtain a better grip, as also in the action of a clerk who more hygienically moistens his fingers with a sponge. The moisture on the hand obviously affords a better grip upon objects, and when there is an imminent demand for action, the mechanisms of palmar sweat secretion prepare automatically for ensuing manipulative activity. Furthermore, the adhesiveness and pliability of the palmar surfaces contribute materially to the keenness of tactual acuity. A dry, stiff skin transmits but poorly the gradations in pressure, in temperature, and in local traction on the skin by which we make judgments regarding the things we touch. This has been shown by D. Katz (5) in his demonstration of the importance of palmar moisture for the tactual identification of various surfaces.

The value of palmar and plantar sweating to the primitive, ungloved, unshod primate where bodily safety depends upon surety of grip is obvious (7). In conditions where fighting or flight or grasp of objects of security may be necessary it would have adaptive value if the mere apprehension of danger were attended by increase in the profusion of sweat. Adaptive functions would also be served if, in the absence of actual apprehension, the palmar sweat glands were suddenly thrown into activity by stimuli which "startle" the animal into a state of "preparedness to react". Considerations such as these provide a rationale for understanding many of the determining influences on palmar galvanic change.

Neural Mechanisms. Neurologically, palmar sweat secretion is very intimately associated with mechanisms controlling reflex grasping, especially as these are dominated by the coördinating centers of the premotor cortex. We find the cortical representation of palmar sweating located within the same general premotor region which is concerned with the coördinative inhibitory control of the posture-maintaining mechanisms (8–17). The destruction of this area results in the loss of ability to inhibit the grasping response, in clumsiness of manipulation, in sluggishness of movement, and in loss of initiative. The functions affected are closely related to those which various studies to be mentioned have shown to be highly correlated with palmar galvanic activity.

Drowsiness and Sleep. Perhaps the most general observation we may make with regard to the palmar changes is their variation with

the state of general alertness. In sleep, as already noted, the resistance tends to be high (conductance low).

Variations in resistance paralleling changes in the state of the organism during various hours of the day were early observed by Müller (25) in 1904 and by Waller (31) in 1919. Richter (26–29) began his reports of studies of the relation of palmar as contrasted with non-palmar areas to sleep in 1924. Farmer and Chambers (21) and Thouless (30) further confirmed this interesting observation. Landis (23), however, in a study mostly of non-palmar areas and with alternating current failed to find a typical high resistance in sleep, and Forbes and Piotrowski (22), studying skin resistance of patients under illumination and other conditions suitable for photographing sleeping posture, also failed to obtain a characteristic high resistance in sleep.

The writer has observed gradually mounting resistance as one becomes drowsy toward the end of the day, and, as sometimes happens, when patients drop off to sleep during galvanic recording. There is frequently also a persisting high resistance during the drowsy period following awakening from sleep. This leads to the conviction that high palmar resistance is not specific for the loss of consciousness but relates rather to certain physiological conditions which predispose toward sleep. With increasing drowsiness or sleepiness the palmar resistance may reach a level comparable with that of sleep.

In hypnotic sleep Estabrooks (20) found the resistance high, but Levine (24) failed to obtain high resistance in 2 of 6 hypnotized subjects. An explanation of exceptional results both in studies of hypnosis and of normal sleep is possibly to be found in the work of Davis and Kantor (19) who observed that the presence of high or of low resistance depended upon whether active or quiescent states were suggested to the patients. States of relative tension or activity may be expected to induce lower resistances than those of relaxation and quiescence, even though both occur in apparent absence of "consciousness". It seems possible, however, that the state of "sleep" is *relative* and not an "*all-or-none*" phenomenon. The average person is probably maximally awake or completely asleep only rarely and briefly in the course of 24 hours. In the intervals his physiological state probably corresponds to varying conditions intermediate between the extreme of tension and alertness on the one hand, and of sound relaxed sleep on the other. It is apparently only when awakening is sudden and we are startled from sleep to a high level of alertness that we find marked and rapid palmar resistance change immediately on awakening.

Startle. Furthermore, it is probably because sudden startling sensory stimuli are highly proficient in arousing the organism momentarily to higher levels of alertness and preparedness to respond that they are so effective as stimuli for the galvanic response.

Teleologically speaking, it is conceivable, as has already been pointed out, that in the absence of a state of continued apprehension by which the gripping surfaces are prepared in advance, the sweat glands will serve their purpose best if they suddenly pour forth sweat whenever the animal is suddenly startled. Actually, the effect is so marked that under a low power microscope the sweat craters on the ridges of the palmar surfaces can be seen literally erupting sweat in response to sudden sensory stimuli (34). Many investigators have noted the most marked galvanic effects after sudden stimuli causing what is variously termed "reflex start", "startle", or "choc" (32–36). The excitation, it should be emphasized, results in the arousal of the individual from a less alert to a more alert condition.

Attention. The fact that sudden unexpected stimuli are "startling" apparently implies a "shift of the attention" in preparation to meet the new aspect of the environmental situation.

Patterson (35) in her study of this type of stimuli found support in Shand, Sully, and Darwin for the inferred importance of the element of attention in reactions of surprise. Abel (37) also demonstrated, by introspective study of the correlates of galvanic change, the frequency with which the reactions are associated with "checks in the course of comprehension". Even the early reports of Tarchanoff (41) and Veraguth (42) emphasized the attention factor, as more recently have also Grünbaum (39) and Messerle (40). Solomon and the writer (38) have shown reduction in galvanic and blood-pressure responses in psychiatrically observed conditions of "impaired attention". Sears (123) and Landis and Hunt (97) in recent studies found the response attendant on change in the direction of mental activity.

Adaptation of Attention. If there is any single observation in galvanic studies which is more characteristic than another it is that the stimuli become progressively less effective with repetition.

Innumerable instances might be cited. Among studies we have already mentioned adaptation was noted in those by Tarchanoff (41), Grünbaum (39), Farmer and Chambers (21), and Wechsler (36). Wechsler and Jones (47) demonstrated the importance of correcting for this influence in the evaluation of association experiments. Darrow and Heath (43) showed that rapid decrease in the magnitude of successive reactions was possibly attributable to overreaction to the initial stimulus and that this was related to "excitability". Small "adaptation", on the other hand, gave suggestion of a "tendency to flee from reality, especially from that involving social relationships". Unpublished data from the study of the psychoses by Darrow and Solomon (38) show the same tendency. Similar indications of reduced adaptation, which Mays (45) and Shipley (46) termed "perseveration", were observed by these two investigators in the withdrawn states of catatonia. It is the writer's conviction that the phenomenon in withdrawn states is primarily a function of the individual's

lack of attention to and comprehension of the stimulating situation. Stimuli early in a series occasion small reactions in these conditions because "attention" is not aroused; later reactions are not reduced by "adaptation" because there has been little of that attention to or comprehension of the stimulus which would favor an increasing disregard of it. In support of this view is the study by Davis (**44**) in which stimuli of varying complexity were repeatedly presented to normal persons. He found that even within a given individual the most rapid decrease in galvanic response to successive excitations occurred when the stimuli were sufficiently simple that all aspects of them could be reacted to on the first presentation. More complex stimuli which were beyond the individual's immediate comprehension, and which presumably would still arouse interest and require attention on later presentations, showed less rapid adaptation of reaction.

Conation. The dynamic aspects of the reaction are perhaps even more emphasized by the identification of the galvanic responses with "conation".

Wells (**56**) in 1924 appears to have first definitely identified the reaction with conation, and Thouless (**54**) in the following year emphasized its relation to "preparedness to react" to a stimulus. Brown (**50**), Aveling (**48**), Stevanović (**53**), Bartlett (**49**), and Cattell (**51**) on the basis of rather extensive and careful study confirm the relation to conative functions and rule out the possibility of a relation to "emotion" in the sense in which their observers understood the term. This particular psychological determinant of the response is especially apparent when the "reflexohmeter"[6] (**52**) has been attached to an automobile driver. "The powerful effect of any situation requiring the mobilization of the driver's energies, such as the sudden slowing of a car in front, the attempt to pass another car on the road, the sudden appearance of a pedestrian in the road, or the sound of a policeman's whistle, is clearly demonstrated."

Alertness. In the study of the conative aspects of the galvanic response the alertness factor, or the preparedness to respond, has received repeated emphasis, notably by Thouless (**54, 55**), Aveling (**48**), and Bartlett (**49**).

Weinberg (**59**) stressed this aspect of the reaction, as did also Levine (**24**). In the study of the relation of the galvanic skin reflex in different skin areas to the total insensible weight loss, by Freeman and Darrow (**57, 58**), a relative specificity of the palmar response for conditions involving an increased alertness was clearly indicated. Reactions of non-palmar areas were most marked in conditions involving an increase, not in alertness, but in "muscular activity".

Apprehension, Anxiety. In those conditions where the state of alertness becomes excessive, as in apprehension, and where it becomes persistent, as in chronic anxiety, the secretory activity of the palms may become extreme.

[6] The Reflexohmeter (Pocket Type), C. H. Stoelting and Co., Chicago.

Hermann and Luchsinger (60) early (in 1878) referred to it as "Angstschweiss". Kuno (6) also identified palmar sweating with "mental stress". Landis (61) observed that the reflex occurred "more frequently than one would expect in individuals whose behavior indicated apprehension". Apprehension or "anticipation" of a stimulus was among the most effective conditions of palmar change noted in the above mentioned study by Freeman and Darrow (57, 58). Solomon and Fentress (62) found "free anxiety" in psychoneurotics typically characterized by low palmar resistances, and Darrow and Solomon (38) found essentially the same relation to hold among psychotic patients.

From the preceding it may be inferred that the secretory and electrical changes in the palms of the hands have a functional or adaptive significance. They are called forth when there is arousal of the organism in response to an imminent demand for an adjustment to the environmental situation. In general, they correspond in magnitude to the degree of arousal or alertness on the high integrative (cortical?) levels. In conditions of stress they may reach maximal intensity. They may, as will be shown elsewhere (91) provide a medium through which we may study the dynamics of the process by which the organism is mobilized to meet internally and externally determined demands for adaptation.

Conductance and Performance. The implication of these observations becomes obvious in a field in which the galvanic skin reflex has as yet been but very little used. It would appear that if the galvanic skin reflex is related to the individual's "mobilization of energies" it should also relate to his performance in various situations in which alertness and facility of response are contributing factors. If palmar conductance is low when one is drowsy and high when he is on the *qui vive*, measurements undertaken on persons who are sufficiently alert will show their conductance to be high and their performance on suitable tests to be high also. The same tests when these persons are sufficiently drowsy will show low conductance and low performance. Under such conditions we may expect a positive correlation between conductance and performance. The demonstration of such a positive relationship is simply a matter of measuring subjects throughout a sufficiently wide range of conditions of alertness.

To test this assumption we have recently run a limited number of subjects at different times during the day under widely varying conditions of alertness, when they were alert and "keyed up" or when they were extremely drowsy as after complete loss of sleep the night before, and have found in those subjects who under various

conditions gave the greater number of words in 2 minutes on a free association test there was also a rather consistent relation of conductance to the performance scores. Subjects who habitually gave less than the average number of associations did not show so marked a relationship. A possible reason for the exception is suggested by the following evidence of the significance of the galvanic skin reflex in relation to "energy mobilization" and performance:

White (69) tested the effect of an electric shock upon memory. He had his subjects learn a series of nonsense syllables and then in some instances within 10 seconds gave them an electric shock and measured the ensuing galvanic reactions. He later tested recall with and without intervening shocks. Those subjects who did poorly in the no-shock condition gave the largest reactions to the shock and incidentally showed improvement in recall. Those who recalled well without a shock gave small galvanic reactions and recalled less well with than without the shock. In other words, without any stimulation these latter subjects were conceivably already fully alert and giving good performance. Those who were improved by the shock possibly needed the stimulus to wake them up. Baker (72) offers results showing a relation of pulse and breathing to effects of stimulation on learning which may be interpreted in a similar fashion. Similar inferences are possible regarding Laird's (79) observations that his best typists were hindered by a loud, distracting noise while those who did poorly under control conditions showed improvement with stimulation.

In a study by Tinker (87) individuals making high scores on intelligence tests under standard conditions showed impaired performance with distraction, while those who made poor scores tended to be improved. Barring the possibility that by laws of chance those who were high would tend to be lower on a second test and vice versa, the results that have been cited suggest that a factor in poor test performance is in many instances an inadequate arousal or "mobilization of energies" for the task, and that an extraneous accessory stimulus may tend to remedy the defect.

In the writer's exploratory study of verbal free association in relation to conductance level already mentioned, he found it possible to facilitate greatly the rate of free association when the rate was low by having the subjects run up a flight of stairs. This activity, of course, also tended to increase conductance and, presumably, alertness. Apparently any stimulating condition which is not too severe and which will "wake a person up" and increase "energy mobilization" and palmar conductance may improve performance.

It is not unlikely that the demonstration by Miller (100), Bills (89), Stroud (101), McTeer (99), Freeman (93, 94) and others that a degree of muscular tension improves certain kinds of performance belongs in this category. Indeed, White (71) has shown that muscular tension tends to increase the palmar conductance. Muenzinger (81) has shown that an electric shock may

produce better learning in rats than no shock even when that shock is given following correct responses.[7] Morey (80) has shown a similar effect of noise upon the swimming rate of rats.

Krechevsky (78) found that in the learning of a dark-positive discrimination habit by rats, an electric shock may compensate for possible "deficiency in attention" consequent to cortical injury. Patrick (85) has demonstrated that shock and various other stimuli may increase the "behavior level" and rapidity of escape of human subjects from a choice reaction box. Also, the evidence offered by Urbantschitsch (88), Jacobson (76), Kravkov (77), and Hartmann (73–75) that the stimulation of one sense organ, such as the ear, increases the sensory acuity of other sense organs, for example the eye, is possibly in part a manifestation of the same general effect. Information of the difficulty of a task may also increase both conductance and efficiency of performance, as shown by White (70). In the light of these observations the report of Waller (68) that students who had low resistances did better on examination than those who had high, and the similar report by Lauer and Evans (65) of a correlation of −.42 between intelligence test scores and resistance are not entirely unexpected. The evidence from the studies of Smith[8] (67), Lynch (66), Jones (64), and Carter, Jones and Shock (63) that words producing large galvanic reactions are remembered better than others probably belongs in the same category.

Doubtless many of the effects we have cited are in part manifestations of the phenomena of neural reinforcement known as "spinal induction" and as "dynamogenesis". As demonstrated by Sherrington (86), stimulation of two separate points on the skin may produce a more vigorous scratch reflex in the spinal dog than the stimulation of either point alone. The facilitating effect on the knee jerk of stimulating sense organs and of muscular tension is also an example. The explanations commonly applied assume that the facilitation may occur by mechanisms such as (a) the increase in the total number of impulses, (b) an increase in the number of impulses reaching the effector per unit of time, and (c) an increase in the number of effector units excited (Morey, 80). These are conceded to be factors in facilitated reinforcement. Especially does reinforcement of central nervous system activity attributable to afferent impulses from the tonic skeletal musculature appear of importance in the light

[7] Where a performance in human subjects is not improved by additional stimulation (82) it is possible, as Muenzinger suggests, that optimal "motivation" is already present. An absence of improvement when shock precedes the rat's choice reaction (83) is possibly due to disturbance of the direction of the animal's "attention", not to absence of an increased arousal.

[8] Those of Smith's results which are interpreted as indicating accelerated forgetting of negatively toned associations having large reactions are, as may be seen by inspection of the data, of questionable reliability.

of effects of muscular tension on performance previously mentioned (89, 93, 94, 95, 99, 100, 101), and in view of the action current studies of Jacobson (96), Max (98), and Davis (92). Such a mechanism of reinforcement, in view of the apparent relation of posture to palmar perspiration (71, 90, 102), and in view of the intimate association of postural with palmar secretory control in the cerebral cortex (8–17), would account for many indications of facilitated central nervous function associated with increased palmar secretory activity reported in this paper. It is of interest that Sears (123) and Landis and Hunt (97) found increased " tension " to be one of the most frequent introspectively observable concomitants of the galvanic response.

Application of Palmar Response. Assuming that the evidence indicates palmar secretory activity in the normal individual to be a concomitant of postural reinforcement of processes in the central nervous system, its possible applications as an indicator of such reinforcement are manifold. In certain types of investigation the galvanic data might even provide a method of control by which the worker could determine whether his subjects approximated the same levels of " energy mobilization " from day to day, thus eliminating one of the great sources of variability in psychological experimentation. What is needed, of course, for testing this possible application is that concomitant palmar conductance data should be obtained when activities are being studied throughout a wide range of determining conditions. In the psychoses and in the neuroses where " energy mobilization " in response to environmental demands occurs abnormally owing to peculiarities of the patient's internal organization, the palmar changes under suitable stimulation may reveal much concerning the psychological and physiological mechanisms operating in a given case; they may even reveal significant facts concerning the progress of the case due either to passing of time or to various forms of therapeutic intervention. With the development of a dynamics of the galvanic skin reflex curve (91) permitting us to identify and measure the essential psychophysiological factors or parameters of response to stimulation and the relation of these to the prevailing " background excitation " upon which all stimulation is superimposed, the usefulness of such a measure should be greatly increased.

Severe Stimuli. The facilitating effects of supplementary excitation with which we have thus far been concerned have obviously been the consequence of relatively mild forms of stimulation. But because a degree of stimulation is facilitative, especially when a person is less than maximally alert, it does not follow that still further excitation

will produce still greater improvement. In fact, there is abundant evidence to the contrary. It has frequently been demonstrated that severe stimuli such as strong electric shocks may entirely disorganize activity. The more complex and the more dependent an activity is upon acquired skills, the greater the unfavorable effect may be. Diserens and Vaughn (103, 106) and Rexroad (105) have amply demonstrated this point in their consideration of the effects of punishment on performance. McKinney (104) has shown the disrupting effect of a form of excessive motivation. Freeman (93) has shown similar effects from too much muscular tension. And since conditions of excessive excitation will often be attended also by very high palmar conductance, it is clear that high conductance and good performance cannot be indiscriminately related. Obviously, there must be a limit to the extent to which marked palmar secretory activity may be associated with increased alertness and capacity for complex adaptive behavior. That other bodily mechanisms may be more intimately related than the galvanic skin reflex to conditions which seriously "excite" or "disturb" the individual is suggested by extensive evidence.

Blood-Pressure. As is well known, blood-pressure normally tends to vary with activity. Especially in the extremes of activity which require the maximal output of the organism, the magnitude of the blood-pressure increase is often remarkable. It is, as Cannon (112) has emphasized, one of the processes by which the organism is mobilized to meet extreme emergencies. The increase in blood-pressure is an accompaniment of activity, and great activity involving correspondingly great demands upon the vital processes is all that ordinarily is required to occasion a rise in level. Increase in blood-pressure is, however, just as in the case of the galvanic skin reflex, a mechanism of preparation for activity, and it may occur before the activity in which it may be useful has started. It may also occur in situations in which a commensurate overt activity never takes place. Especially frequent in modern life are the situations calling for offense or defense, but requiring that overt behavior be suppressed in the interest of more subtle forms of action or more distant ends. These situations may occasion increase of blood-pressure in the absence of a corresponding overt activity. And in view of the fact that such reactions of self-preservation in our modern society seldom call for a degree of motor manifestation which would utilize an extreme increase in blood-pressure, we may in general characterize such increases as excessive. They represent a degree of "energy mobili-

zation " greater than that required by the exigencies of the threatening situation.

But not only may a marked increase in blood-pressure represent mobilization of energies beyond the needs of the organism; it may at the same time represent a reversion of the organism to a more primitive and automatic level of behavior. Evidence indicates that a marked rise in blood-pressure in the intact animal is symptomatic of activity in that portion of the central nervous system, the hypothalamus, from which the sympathetic functions of emergency energy mobilization are primarily controlled. In this general region are neural mechanisms which, as Cannon, Bard, and others (1, 107–120) have shown, may function independently of cortical control in extremes of activity characterizing offensive and defensive behavior. When released from inhibitory restraint these mechanisms give rise to activity in the sympathico-adrenal system characterized by marked increase in blood-pressure. The conditions favoring the release of these mechanisms from inhibitory restraint are apparently those involving the perception of a threat to the safety of the organism or to the habitual modes of thought and action with which it has become identified. Such perceptual patterns have been conceived as coming into " conflict " with already existing patterns of thought and action, and the intracortical conflict thus produced has been thought of as occasioning lessened (energy for?) control of subcortical functions. The result has been referred to as a " relative functional decortication " (114). There is reason to believe that in the intact human being " conflicts " resulting from threats to personal safety, prestige, property, ideas, or ideals, and interfering with normal restraint over subcortical (hypothalamic?) mechanisms, may thereby occasion the rise in blood pressure commonly associated with these conditions of conflict. Often the overt behavior, especially if the " excitement " or " emotion " is extreme, may suggest a dethronement or abdication of the mechanisms of rational control.

Since the mechanisms of rational control presumably involve symbolic processes which are to a large extent identified with the phylogenetically more recently developed portions of the cortex, and since the mechanisms which are released from restraint are apparently the phylogenetically older, predominantly motor, and motor-coördinating cortical and subcortical mechanisms, it appears that in ideationally initiated emotion the primary site of " functional decortication " must be in the higher level, most recently developed, possibly most complex and most easily disorganized portions of the cerebral cortex, namely,

in the so-called " association " or " silent " areas. Considerable clinical and experimental evidence, especially in the case of the frontal cortical areas, is consistent with such an interpretation.[9] In so far as we may eventually be able to localize the site of cortical conflicts causing decreased restraint over more automatic functions, to that extent may we eventually be able to speak not of a " relative " but of a specific " functional decortication ". To the extent that this reasoning is correct and to the extent that blood-pressure is symptomatic of the release of relatively primitive automatic functions from higher level control, to that extent may marked rise in blood-pressure, in addition to revealing sympathico-adrenal activities of extreme " energy mobilization ", provide also an indication of " intracortical conflict " and possibly of " relative functional decortication ".

With the advent of excitement and attendant increase in blood-pressure the palmar secretory changes are likely, as already suggested, to be of greatly reduced value as indicators of facilitation in the cen-

[9] The release of mechanisms of coördinated motor activity following extirpation of the frontal cortex of the monkey and the suppression of spontaneous activity when both frontal and premotor areas are removed, as shown by Fulton, Jacobsen and Kennard (11), provides an example of the evidence favoring location of an inhibitory control of motor activity in the " silent " areas of the cortex. Evidence for either a direct or indirect inhibitory control of hypothalamic mechanisms by the cortex has already been mentioned (114). Very recently Kabat, Magoun, and Ranson (121) have demonstrated that stimulation of probable pathways from the frontal pole of the brain to the anterior borders of the hypothalamus typically causes a fall of blood-pressure. Unless these pathways prove to mediate positive parasympathetic excitation, they provide a possible anatomical basis for cortical inhibitory restraint of motor and sympathico-adrenal mechanisms of the hypothalamus.

The antithesis of release of motor coördinating mechanisms from cortical restraint is possibly seen in the conditions of chronic anxiety and certain states of depression previously referred to. Here again the precipitating ideational activity is presumably to a considerable extent identified with the phylogenetically most recent portions of the brain, *i.e.* with the " association " areas. In view of the presumed governing and inhibitory rôle of these newer portions of the cortex, it is conceivable that excessive chronic activity in these regions may result in persisting inhibitory suppression of activity in motor coördinating mechanisms of the cortex of which the premotor region is for present consideration the most important. Such inhibition conceivably should produce symptoms analogous to those following extirpation of the premotor area. The suppression of psychomotor activity commonly seen in anxious depression, the disposition toward forced grasping observed by Rabiner (122) and also by Solomon and the writer in cases of anxiety and depression, and the excessive palmar sweating (38, 60, 61, 62), especially when these occur together, may possibly thus be provided a neural mechanism.

tral nervous system. This would follow, of course, if increase in palmar sweating then accompanied an assumed "functional decortication". But the palmar secretory activity may not in excited states be indiscriminately inferred even to relate to the degree of general disturbance of the organism. Evidence from various sources indicates that disturbing conditions which occasion a discharge of adrenalin into the blood may actually be associated with a decrease in palmar sweat secretion. This possibly occurs through an inhibitory action of adrenalin upon the parasympathetic-like mechanism of the peripheral sweat glands, and possibly also through effects of vasoconstriction upon the blood supply.[10] An instance of such action is found in tests by Dr. R. L. Jenkins and the writer in which the normal galvanic responses to sensory stimuli were suppressed when these stimuli were immediately preceded by intravenous injection of 1/20 c.c. of 1–1000 adrenalin. Since disturbing influences may directly affect the efficiency of cortical function, and, through the action of adrenalin, interfere with the peripheral secretory activity of the palmar sweat glands, palmar secretory activity *in extremely excited states* presents many difficulties to interpretation. A marked increase in blood-pressure not attributable to overt activity may provide valuable indication of the advent of such a state of excitement and suggest an interpretation of the galvanic record altered to meet the changed physiological conditions.

Let us briefly review the evidence that in persons with intact nervous systems palmar skin conductance supplemented by blood-pressure provides an index of adaptive mobilization.

(1) Palmar perspiration is functionally valuable for the improvement of tactual acuity and grip upon objects, and it is called forth in situations demanding increased alertness and mobilization of energy for adaptive response (4–7).

(2) Palmar conductance is low in conditions predisposing toward sleep and sleepiness (18–31). (It should be noted that fatigue and exhaustion do not necessarily imply sleepiness.)

(3) Palmar skin conductance is increased by situations causing startle, attention, alertness, conation, anticipation, and apprehension (32–62).

(4) An increase in palmar conductance is frequently associated with evidence of improvement in various performances. Both in-

[10] Central mechanisms may of course possibly also contribute to this effect.

creased conductance and improved performance may follow various forms of moderate stimulation (**63–88**).

(5) The location of the cortical control of palmar secretory reactions within the same general region concerned with inhibitory control of posture (especially reflex grasping), and the demonstrated relation of palmar activity to postural conditions, suggests that facilitative effects often associated with palmar galvanic activity may be primarily a result of the reinforcement of central nervous system activity by impulses arising within the tonic skeletal musculature (**89–102**).

(6) Very strong stimulation involving excessive "mobilization of energy" may impair rather than improve performance and distort the relation to palmar secretory activity (**103–106**).

(7) Excessive and disturbing excitation in which primitive automatic mechanisms are released from higher level control tends to be associated with a marked increase in blood-pressure (**1, 107–120**) and may provide indication that there has been a departure of galvanic measurements from parallelism with higher level facilitative processes. Marked blood-pressure increase in the absence of overt activity may provide indication of intracortical conflict, and possibly of "relative functional decortication".

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122. RABINER, A. M., Significance of Panic and States of Consciousness in Grasping Movements. *Arch. Neurol. & Psychiat.*, 1935, **33**, 975–985.

123. SEARS, R., Psychogalvanic Responses in Arithmetical Work: Effects of Experimental Change in Addition. *Arch. of Psychol.*, 1933, **24**, No. 155. Pp. 62.

THE INFLUENCE AND DEPENDENCE OF PSYCHOLOGICAL JOURNALS ON EACH OTHER

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It was with the hope of adding to our knowledge of the interrelations between the different fields of psychology that a study was made of cross-references between psychological journals.[1] Some journals remain fairly close to the central currents of interest in psychology, and certain journals are conspicuous for their emphasis on important scientific problems. By selecting journals which were fairly representative of experimental psychology, physiological psychology, animal psychology, child psychology, psychoanalysis, abnormal psychology, and educational psychology, we thought it would be possible to secure a quantitative measure of the extent to which each psychological field influences and is influenced by each of the other psychological fields. The present study was limited to journals in the English language and to that part of each journal which was published in 1933. We realize that it would also be quite valuable to know more about the influence on each other of several journals in different languages, and many would like to have more accurate information than is now available in regard to the changes in influence and dependence between some of the more important journals in English during the past 10 or 20 years.

Method Used in Selecting Journals for the Present Study. A form letter was addressed to 54 psychologists representing practically all points of view, and judgments were requested on the suitability of various journals for the present study. A tentative list of 61 journals was enclosed, and each individual was asked to cross off journals and to add journals which were not on the list. A reply was received from 45 of the 54 persons addressed, and of these 45 persons 39 filled out the form, 2 were in Europe, 2 said they were not competent to give the judgments, and 2 said the form letter could not be answered intelligently.[2]

[1] We wish to acknowledge the valuable assistance of Mrs. Marjorie S. Drought and Mrs. Margery H. Trowbridge in carrying out the present study.

[2] Special assistance in selecting journals which would be fairly representative of different psychological fields was given by J. E. Anderson, Leonard

Thirty-six journals were first selected on the basis of the returns of the 39 judges. Five of the journals which were selected at first were later omitted from the study because there were so few cross-references between them and the obviously psychological journals. These 5 apparently non-psychological journals were *Mind, J. Phil., Aust. J. Psychol. & Phil., J. Neurol. & Psychopath.,* and *Person. J.* The *Psychoanal. Quart.,* which was also selected at first, was later left out because it began publication in 1932 and is listed as being on hand in only a very few libraries in the United States. There was only 1 number of the 1933 *Brit. J. Psychol., Monog. Suppl.,* and this journal was combined with *Brit. J. Psychol., Gener. Sect.* There were only 2 monographs in the 1933 *Comp. Psychol. Monog.,* and this journal was combined with *J. Comp. Psychol.* Detailed results are given for 28 journals which are listed in Table 1.

When a journal in Table 1 began publication in 1920 or later, the date of the first volume is given in parentheses after the name of the journal. When the name of 1 of the journals in Table 1 has changed, we have given the former name or names in parentheses after the present name of the journal. We have used that portion and only that portion of each of these journals which was published in 1933, regardless of the numbers of the volumes. Monographs 549 to 594 inclusive (except 575) of *T. C. Contr. to Educ.* were all used because they were published in 1933, but No. 575 was not used because it is dated 1934. The journals which were used are classified in 12 groups in Table 1, and these journals are fairly representative of the different fields of psychology.

Procedure Used in Counting the Cross-References Between Psychological Journals. The method used with each article or monograph in the 1933 part of each journal was as follows: If a bibliography or list of references were included, these references were all that were used. When there was no bibliography, the references given in footnotes were used, and we did not pay any attention to whatever references there may have been in the main body of the article. We tried to count each specific reference only once in a single article regardless of the number of *op. cits., loc. cits.,* etc. When footnote references were followed by "Additional References", both kinds of references

Carmichael, K. M. Dallenbach, J. F. Dashiell, S. W. Fernberger, George Humphrey, W. S. Hunter, S. E. Jelliffe, C. M. Loutitt, J. A. McGeoch, Joseph Peterson, Samuel Renshaw, C. P. Stone, R. M. Yerkes, J. E. W. Wallin, R. R. Willoughby, and R. S. Woodworth. We were also aided by the senders of some 15 supplementary letters.

TABLE 1

PSYCHOLOGICAL JOURNALS AND MONOGRAPH SERIES IN THE ENGLISH LANGUAGE

GENERAL AND EXPERIMENTAL

1. *Brit. J. Psychol., Gener. Sect.* Also *Brit. J. Psychol., Monog. Suppl.*
2. *Amer. J. Psychol.*
3. *J. Gener. Psychol.* (1928–)
4. *Psychol. Bull.*
5. *Psychol. Rev.*

EXPERIMENTAL

6. *Arch. of Psychol.*
7. *J. Exper. Psychol.*
8. *Psychol. Monog. (Psychol. Rev., Monog. Suppl.)*

PHYSIOLOGICAL

9. *J. Physiol.*
10. *Amer. J. Physiol.*
11. *Physiol. Revs.* (1921–)

ANIMAL

12. *J. Comp. Psychol. (J. Animal Behav.; Psychobiol.).* Also *Comp. Psychol. Monog. (Behav. Monog.)*

ANIMAL AND CHILD

13. *Genet. Psychol. Monog.* (1926–)
14. *Ped. Sem. & J. Genet. Psychol. (Ped. Sem.)*

CHILD

15. *Child Develop.* (1930–)

PSYCHOANALYTIC

16. *Int. J. Psycho-Anal.* (1920–)
17. *Psychoanal. Rev.*

ABNORMAL

18. *Brit. J. Med. Psychol. (Brit. J. Psychol., Med. Sect.)* (1920–)
19. *Amer. J. Psychiat. (Amer. J. Insan.)*
20. *Arch. Neurol. & Psychiat. (Arch. Neurol.)*
21. *J. Nerv. & Ment. Dis.*

ABNORMAL AND SOCIAL

22. *J. Abn. & Soc. Psychol. (J. Abn. Psychol.; J. Abn. Psychol. & Soc. Psychol.)*

SOCIAL

23. *J. Soc. Psychol.* (1930–)

APPLIED

24. *J. Appl. Psychol.*

EDUCATIONAL

25. *Brit. J. Educ. Psychol.* (1931–)
26. *J. Educ. Psychol.*
27. *J. Educ. Res.* (1920–)
28. *T. C. Contr. to Educ.*

TABLE 2

THE INFLUENCE AND DEPENDENCE OF PSYCHOLOGICAL JOURNALS ON EACH OTHER

JOURNALS	1. *Brit. J. P., Gener. Sect.*	2. *Amer. J. P.*	3. *J. Gener. P.*	4. *P. Bull.*	5. *P. Rev.*	6. *Arch. of P.*	7. *J. Exper. P.*	8. *P. Monog.*	9. *J. Physiol.*	10. *Amer. J. Physiol.*	11. *Physiol. Revs.*	12. *J. Comp. P.*	13. *Genet. P. Monog.*	14. *Ped. Sem. & J. Genet. P.*
1. *Brit. J. P., Gener. Sect.*	—	1.8	.7	.5	2.3	.2	.5	.9	.5	.7		1.8	.5	
2. *Amer. J. P.*	.2	—	1.1	.7	1.8	1.1	3.5	2.6	.3	.1		1.2	.1	1.3
3. *J. Gener. P.*	.4	9.3	—	2.4	6.4	2.1	9.3	4.9	1.1	1.1	.1	2.5	.7	1.6
4. *P. Bull.*	2.6	5.2	1.4	—	3.9	1.6	3.9	1.7		.1		.9	.4	2.4
5. *P. Rev.*	1.5	4.4	1.5	1.3	—	.6	3.4	1.9		.2		3.2	1.5	1.9
6. *Arch. of P.*	4.5	4.5	.2	2.5	3.6	—	3.0	1.8	.3	.2		3.1	1.3	1.7
7. *J. Exper. P.*	3.2	9.9	4.8	1.1	4.6	1.9	—	3.6	1.9	1.9	.2	2.7	.4	1.9
8. *P. Monog.*	.9	7.5	.9	.6	3.5	1.2	6.6	—	3.5	4.6	.3	4.6	.9	.6
9. *J. Physiol.*									—	7.2	1.1			
10. *Amer. J. Physiol.*									7.2	—	1.3			
11. *Physiol. Revs.*	.1	.1	.2		.2	.1	.1	.1	5.5	5.8	—	.8		.2
12. *J. Comp. P.*	.5	4.1	.7	2.0	3.7	.5	2.8	2.3	.8	3.9	.3	—	.7	5.0
13. *Genet. P. Monog.*	.4	2.2	.7	1.6	3.7	.7	3.1	.6	.7	1.5	.1	4.7	—	4.7
14. *Ped. Sem. & J. Genet. P.*	.4	2.5	.7	2.5	2.9	1.0	2.7	2.6		.6		7.1	1.7	—
15. *Child Develop.*		4.1	1.0		2.7	1.4	1.7	.7		.3		1.0	3.1	10.5
16. *Int. J. Psycho-Anal.*	.9													
17. *Psychoanal. Rev.*		.3	.3		.3									
18. *Brit. J. Med. P.*	2.2	.7	.2	2.2		.7	1.5							
19. *Amer. J. Psychiat.*	.2	.1	.2	.3	.5	.2	.2		.1	2.3	.3			
20. *Arch. Neurol. & Psychiat.*							.1	.1	.9	2.1	.2	.1		.1
21. *J. Nerv. & Ment. Dis.*		.1			.1	.1			.5	1.5	.2			
22. *J. Abn. & Soc. P.*	2.4	1.4	.7	2.4	.3	1.0	.7	.7					.7	.7
23. *J. Soc. P.*	.4	2.3		1.9	4.2	1.5	1.5	1.9				1.5		1.1
24. *J. Appl. P.*	.3	1.0	.3	1.8	3.1	.5	.5	.8		.3		1.8	1.0	2.3
25. *Brit. J. Educ. P.*	9.1	1.0		.5	1.4			.5						
26. *J. Educ. P.*	6.0	2.1		.2	2.7	.4	.4	2.7					.8	1.4
27. *J. Educ. Res.*	.9	1.2	.2	.4	.1	.4	1.3						.5	1.2
28. *T. C. Contr. to Educ.*	.2	.2	.1		.1	.2	.1	.3				.1		.1
Number of Journals	21	23	(19)	18	22	21	21	19	13	18	(10)	16	(15)	18
Med. Percentage	.9	2.1	(.7)	1.5	2.7	.7	1.5	1.7	.8	1.3	(.3)	1.8	(.7)	1.5

TABLE 2

THE INFLUENCE AND DEPENDENCE OF PSYCHOLOGICAL JOURNALS ON EACH OTHER

15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	A.	B.	C.	D.		
Child. Develop.	*Int. J. Psycho-Anal.*	*Psychoanal. Rev.*	*Brit. J. Med. P.*	*Amer. J. Psychiat.*	*Arch. Neurol. & Psychiat.*	*J. Nerv. & Ment. Dis.*	*J. Abn. & Soc. P.*	*J. Soc. P.*	*J. Appl. P.*	*Brit. J. Educ. P.*	*J. Educ. P.*	*J. Educ. Res.*	*T. C. Contr. to Educ.*	Reference to Same Journal	Reference to Other Journals on List	All Other References	Total Number of References	Number of Journals	Med. Percentage
			.5	.5		.2		.5		1.6	2.3			9.4	15.8	74.8	436	17	.5
.2				.1		.2	.7	.1	1.0		.4	.2		12.2	16.8	71.0	1,008	20	.6
			.4	.5	.3		1.2	.3	.5		1.6	.1	.3	6.0	46.9	47.2	755	22	1.1
.4	.1	.2	.1	.1	.2		1.0	.9	2.3	.2	10.4	2.0	.2	2.0	42.1	55.9	3,273	24	1.0
				.2	.4	.4	.6	.6	.2		.8			14.3	24.6	61.1	475	18	1.1
		.2	.2		.3	.2	.8	.5	1.7		4.3	.8	.8	2.6	36.3	61.1	606	22	1.1
					1.3		1.7		.6		1.5			14.3	43.2	42.5	475	17	1.9
					.6				.9		1.2	.3		4.3	38.3	57.3	347	17	.9
											.1	.1		19.1	8.5	72.4	2,093	4	.6
					.1									22.0	8.7	69.4	4,260	3	1.3
.2					.2									0.7	13.6	85.8	2,877	12	.2
.2						.3	.3	.3			.8	.2		20.8	29.3	49.8	614	19	.7
1.0		.1		.1	.7	.1	.6	.3	.4		2.7	.3	1.0	2.7	32.5	64.8	677	24	.7
.4				.3	.4		.7		1.7	.3	2.5	1.4	1.3	8.4	33.8	57.8	692	20	1.4
—				.3	1.0		1.4	.7	1.0		2.0	.3	1.0	5.1	34.2	60.7	295	18	1.0
	—	.6	2.4					.3		.6				18.5	4.9	76.6	329	5	.6
	1.0	—	.3	.7	2.3	.3								2.6	5.6	91.7	303	8	.3
	1.0	.5	—	2.4	.5	1.7	2.4	1.0					.7	0.7	17.8	81.5	410	14	1.0
	.1		.2	—	8.6	1.9	.1							5.1	15.4	79.5	963	15	.2
.1			.1	1.0	—	1.9	.2							7.6	6.8	85.7	2,912	11	.2
	.1	.2		3.3	4.7	—								1.4	10.8	87.8	1,579	10	.2
.7				3.1		.7	—	2.4	.3		.3	.3		7.9	18.9	73.2	291	17	.7
.4			1.5				10.7	—	6.5		3.1			5.7	38.5	55.7	262	14	1.7
.3					.3		1.3	1.0	—	1.3	7.8	1.6	1.0	12.4	28.2	59.4	387	20	1.0
										—	3.8			1.9	16.3	81.8	209	6	1.2
				.2			.8	.6	2.9		—	3.9	.8	15.2	25.9	58.9	487	15	.8
.1					.1		.6	.2	2.2	.9	4.7	—	2.4	4.5	17.2	78.3	1,035	17	.6
							.2	.1	.2		2.1	1.6	—	2.1	5.7	92.3	2,947	14	.2
(9)	(5)	6	(9)	13	18	11	18	(16)	15	(6)	19	(14)	10						
(.4)	(.1)	.2	(.3)	.5	.4	.3	.8	(.5)	1.0	(.8)	2.1	(.3)	.9	5.9	18.4	70.2			.8

were used. No record was made of references in " Books Received " and " Notes and News ", and we did not count articles referred to as " In press ", " To be published ", and " Unpublished ". We included reviews of books and monographs, abstracts, theses " On file in the library of ——— University ", and papers " To appear in ——— Journal ".

Two people worked together in all of the tabulation, and any errors that may have been made were few in number. A few errors were difficult to avoid when authors referred to the *Brit. J. Psychol.*, because there is no journal by this name, and each of these references was assigned to *Brit. J. Psychol., Gener. Sect.; Brit. J. Psychol., Monog. Suppl.; Brit. J. Med. Psychol.;* or *Brit. J. Educ. Psychol.* A reference described by the author as a " Publication of Teachers College, Columbia University " was not counted under *T. C. Contr. to Educ.* The common mistake of referring to the *J. Genet. Psychol.* was not the cause of any confusion.

For the 1933 part of each journal, we counted the number of references (1) to the same journal, (2) to each of the other journals listed in Table 1, and (3) to all other references including books, monographs, and journals not listed in Table 1.

Results. The principal results of the study are shown in Table 2. All of the figures in the body of the table are percentage scores except those given in the second and third columns from the right and in the second row from the bottom. The references to which we refer occur in the journals listed at the left of the table and the references are to the journals whose names are written across the top of the table. The percentage scores in the table show the extent to which each journal influences and is influenced by each of the journals, including itself.

The figures in the first row of Table 2 are concerned with the references made in the 1933 *Brit. J. Psychol., Gener. Sect.* The total number of references in this journal, for 1933, was 436; 9.4% of these references were to the same journal, 15.8% were to the other journals on our list, and 74.8% were other references. These 3 percentage values total 100. Of the total of 436 references, 1.8% were to *Amer. J. Psychol.*, and there were less than .05% to *Physiol. Revs.* The percentage scores to the right of *Brit. J. Psychol., Gener. Sect.* and below the names of the journals given at the top of the table total 15.8%. The last 2 figures in the first row indicate that in the references in *Brit. J. Psychol., Gener. Sect.*, there were at least .05% of references to each of 17 journals on our list, not counting the refer-

ences to the same journal, and the median of these 17 percentages is .5%.

The meaning of the figures in the first column of Table 2 is as follows: Two-tenths of 1 per cent of the 1,008 references in *Amer. J. Psychol.* were to *Brit. J. Psychol., Gener. Sect.;* .4% of the 755 references in *J. Gener. Psychol.* were to *Brit. J. Psychol., Gener. Sect.,* and less than .05% of the 2,093 references in *J. Physiol.* were to *Brit. J. Psychol., Gener. Sect.* The 2 lower figures in Column 1 show that the number of references made to *Brit. J. Psychol., Gener. Sect.,* was at least .05% in 21 journals, not counting the same journal, and the median of these 21 percentages is .9%.

The percentage scores in Column A indicate that the largest number of references to the same journal occurred in *J. Physiol., Amer. J. Physiol., J. Comp. Psychol.,* and *Int. J. Psycho-Anal.;* and the smallest number of references to the same journal occurred in *Psychol. Bull., Physiol. Revs., Brit. J. Med. Psychol., J. Nerv. & Ment. Dis., Brit. J. Educ. Psychol.,* and *T. C. Contr. to Educ.* The figures in Column A give a measure of the degree of interest or lack of interest of each journal in itself. These scores range from .7% to 22.0%, with a median at 5.9%.

The percentage scores in Column B show the number of references to other journals on our list, and these values afford an approximate measure of the extent to which each of the journals is psychological in nature. The interpretation of these scores will be influenced by the value one places on journals in languages other than English, and by one's attitude toward the type of material that is sometimes included in books. To the extent that these figures indicate the psychological nature of the journals, some of the most psychological journals are *J. Gener. Psychol., Psychol. Bull., Arch. of Psychol., J. Exper. Psychol., Psychol. Monog., Genet. Psychol. Monog., Ped. Sem. & J. Genet. Psychol., Child Develop.,* and *J. Soc. Psychol.;* and some of the least psychological journals are *J. Physiol., Amer. J. Physiol., Int. J. Psycho-Anal., Psychoanal. Rev., Arch. Neurol. & Psychiat.,* and *T. C. Contr. to Educ.* These scores range from 4.9% to 46.9%, with a median at 18.4%.

The ratio of the number of self-references to the number of references to other journals on our list may be calculated from the figures given in Columns A and B. There were more self-references than references to all other journals on our list in *J. Physiol., Amer. J. Physiol., Int. J. Psycho-Anal.,* and *Arch. Neurol. & Psychiat.* The self-references were almost but not as numerous as references to other

journals in *Amer. J. Psychol.* and *J. Comp. Psychol.* The self-references were less than 10% as numerous as references to other journals on our list in *Psychol. Bull., Arch. of Psychol., Physiol. Revs., Genet. Psychol. Monog.,* and *Brit. J. Med. Psychol.*

The figures in the last 2 columns show that the journals which refer to the largest number of journals on our list and which refer most frequently to these journals are *J. Gener. Psychol., Psychol. Bull., Psychol. Rev., Arch. of Psychol., J. Exper. Psychol., Genet. Psychol. Monog., Ped. Sem. & J. Genet. Psychol., Child Develop., J. Soc. Psychol.,* and *J. Appl. Psychol.;* and that the journals which refer to the smallest number of journals on our list and which refer least frequently to these journals are *Brit. J. Psychol., Gener. Sect.; J. Physiol., Amer. J. Physiol., Physiol. Revs., Int. J. Psycho-Anal., Psychoanal. Rev., Amer. J. Psychiat., Arch. Neurol. & Psychiat., J. Nerv. & Ment. Dis., Brit. J. Educ. Psychol.,* and *T. C. Contr. to Educ.*

The figures in the last 2 rows in the table show that the journals which are referred to by the largest number of journals on our list and which are referred to most frequently by these journals are *Amer. J. Psychol., Psychol. Bull., Psychol. Rev., J. Exper. Psychol., Psychol. Monog., J. Comp. Psychol., Ped. Sem. & J. Genet. Psychol.,* and *J. Educ. Psychol.;* and that the journals which are referred to by the smallest number of journals on our list and which are referred to least frequently by these journals are *Physiol. Revs., Child Develop., Int. J. Psycho-Anal., Psychoanal. Rev., Brit. J. Med. Psychol., J. Nerv. & Ment. Dis., Brit. J. Educ. Psychol.,* and *J. Educ. Res.* The figures in the last 2 rows have been enclosed in parentheses when the journal in question began publication in 1920 or later.

Psychologists who specialize in different divisions of the science will be interested in different patterns of figures in the central part of the table, and we shall call attention only to a few general tendencies. The general, experimental, animal, social, and applied journals are fairly high for the influence they exert on other journals and for the extent to which they are influenced by other journals. Most of the references which are given in the physiological journals are to other physiological journals, and most of the references by other journals to the physiological journals are in the experimental, animal, and abnormal journals. It appears odd that the authors of *J. Physiol.* and *Amer. J. Physiol.* should make no use of the material in the experimental, animal, and abnormal journals. The psychoanalytic journals are quite low in the influence they exert on other journals, and the psychoanalytic journals refer to other abnormal journals

much more frequently than the other abnormal journals refer to them. It is difficult to understand how educational psychology can be taking advantage of all of its opportunities when it makes no use of the material in the physiological and abnormal journals. The percentage scores for the 5 British journals (Nos. 1, 9, 16, 18, and 25) show that they are influenced by American journals to approximately the same degree that American journals are influenced by them.

A study especially of the largest and smallest percentage scores in each of the 28 rows and 28 columns of Table 2 will bring out a number of facts about the dependence of different psychological journals on each other and in regard to various interrelations between the different fields of psychology; and in order to make some of the tendencies in the central part of the table more legible, we have placed the largest percentage score or scores in each row in heavy type.

BOOK REVIEWS

McGRAW, MYRTLE B., *Growth: A Study of Johnny and Jimmy.* New York: D. Appleton-Century Company, 1935. Pp. xxi+319.

Observations on selected behaviors of a pair of twin boys during the first 2 years of life are presented in this book. For the most part the material is in running account form concerning a given item of behavior, first of one twin and then of the other. The observations are interwoven with the author's comments and statements of point of view on the nature and principles of early behavior growth.

The investigative side of the book had a twofold purpose: (1) to study the process of development as it is manifested in the growth of particular behavior patterns of the human infant and (2) to evaluate the influence of exercise or use of an activity upon its development. The author states that the co-twin method was selected as the most practical, though not the most desirable, method of studying the effect of exercise upon the development of particular performances.

The plan of study involved keeping the infants in the clinic laboratory approximately 35 hours a week, the remainder of their time being spent in their own home with their father and mother and 5 siblings. The exercise program was initiated at 20 days of age. During each day of the early months the trained twin was stimulated at two-hour intervals. Later the exercise program became more extensive. The untrained twin was placed in a crib in the clinic nursery and taken into the laboratory at first weekly, then biweekly and finally monthly for observation and records.

Only the briefest description of the training methods is given. During the early months the training apparently consisted entirely of frequent stimulations for exercising what the author classifies as phylogenetic activities: the Moro reflex, suspension-grasp reflex, inverted suspension, crawling and creeping movements, erect locomotion, assumption of a sitting posture, assumption of an erect posture, reaching-prehensile reactions, reactions to rotation, and reactions to cutaneous irritation. Later, attempts were made to promote the so-called ontogenetic behavior activities by watching for signs of an emerging ability and encouraging its exercise. For example, as soon as the child began to make definite creeping movements lures were moved before him. The amount of time devoted daily to systematic

exercise was about 3 hours. The "ontogenetic" behaviors studied were swimming, diving, ascending and descending inclines, getting off stools, roller skating, jumping, and manipulation of graded stools and boxes to obtain a lure.

Such exercise as was given did not appear to hasten the development of the "phylogenetic" behaviors. Precise records of the amount of stimulation of any one type of behavior were apparently not made and no account was kept of similar exercise that might have taken place in the home. In some of the activities there was considerable self exercise. For example, in regard to rolling over, the author states:

> "The method of stimulation consisted of attracting his attention to an object and then moving the object on the surface of the bed from a position at one side of his face to one above his head. As a matter of fact, stimulation was scarcely necessary. When an infant first begins to roll over, he does it repeatedly, sometimes almost to the exclusion of other activities. In any event, it was obvious that such stimulation as we were able to give in this investigation in no way modified the development of this performance in Johnny. So the behavior-pattern of rolling over appears to be one which, in the early stages at least, is not noticeably modifiable by mere repetition of performance" (p. 99).

Since the child himself introduced so much practice, it does not seem surprising that additional practice superimposed by the experimenter was not effective, but the conclusion that repetition did not modify the behavior seems unwarranted.

On the other hand, considerable evidence is presented showing the early acquisition by the trained twin of such behaviors as ascending and descending inclines, getting off stools, roller skating, jumping off high pedestals, and manipulation of graded boxes and stools to obtain lures. It is to be regretted that the comparison of the trained twin with the untrained twin and with other children was not more systematically undertaken. Out of the running accounts of the behaviors of the two twins it is difficult to find data on exactly the same items, and references to other children of similar ages are often vague. The reader is forced to comparisons based on his own knowledge of the acquisition of such behaviors by other children. However, it seems quite evident that the trained twin did show unusually accelerated behavior in the above respects.

When the twins were 22 months old, the hitherto untrained twin was subjected to 2½ months' exercise in essentially the same situations in which the other twin had been exercised earlier. The methods were not identical, the experimenter using "whatever means were

most effective in evoking the desired activity". What these means were is not stated, and it is questionable whether the best of training methods were employed, utilizing the second child's increased comprehensive powers. At any rate, the second boy did not take on the behaviors in a shorter time than his brother had done at an earlier age. The author interprets this as indicating that the effectiveness of a particular external factor is contingent upon the time at which the activating agent is introduced as well as the fact or nature of its introduction. There are too many uncontrolled variables, however, to permit acceptance of this conclusion without further check. It is always precarious to generalize from a given training procedure to all training procedures. Perhaps the experimenter was luckier in her choice of procedures for the younger child. No one knows how much allowance should be made for variance in such behaviors, even in identical twins who are given identical training at the same ages. In the case of the twins of this study, there was question as to whether they were monozygotic and the training procedures were certainly not the same.

There was apparently no transfer effect of the early exercise to certain types of problem situations similar to those often used in animal experimentation: multiple sticks, tool construction, string situations, suspended basket, hook and ring situation, etc. At least two reasons might be advanced why transfer would not be expected: (1) the skills previously acquired could not be utilized directly in the problem situations, and (2) the skills of the two twins had been approximately equalized by the exercise procedures before the problem situations were introduced.

There was no superiority of the first trained twin in intelligence, but he was not trained in activities that would be expected to affect intelligence. In regard to language, for example, the author states that it was impossible to arrange laboratory conditions which would stimulate language usage. The child's time was taken up with exercise of motor skills, and no mention is made of attempts to provide the kind of enriched experiences that might affect intellectual growth.

Throughout the book, the author emphasizes her interest in the process of development rather than in end results or levels of achievement. Behavior in getting off high stools afforded "an excellent illustration of the error involved in judging developmental performances in terms of the end results rather than in terms of the process of attainment. If the comparison of Johnny's and Jimmy's achievements were limited to objective ratings in terms of the frequencies of

success in getting off stools of certain heights, it is obvious how grossly misrepresentative of growth the data would be. It is not so much the *fact* that he gets off a stool of a particular height as it is the *way* he does it which is of import to the study of growth" (p. 237). Again, she states, "This study has been more concerned with the sequential phases of development of infants who received different amounts of external stimulation than it has been with the levels of achievement" (p. 278).

Looked at from one standpoint sequential phases are a succession of end results or levels of achievement. The significance of differing methods of attack by the two twins is not clear to the reviewer except as those differences led to differences in effectiveness of the children in achieving the end results. From the discussion of particular items of behavior one gets the impression that the course of behavior development is pretty much the same in most infants, since there is considerable description of the behavior of "the baby" as a generalized concept. Whether such description is based on the author's actual observation or upon her knowledge of the literature is not clear.

The author attributes the high degree of muscular relaxation of the one twin to the training but is unwilling to attribute the child's superiority in physical growth to the motor exercise.

The general principles of modification of growth as set forth in the concluding chapter include the following points: (1) Behavior patterns which have achieved a high degree of fixity and are controlled at an infracortical level are subject to no appreciable alteration through mere repetition of the activity. (2) Activities of ontogenetic origin can be greatly accelerated through exercise. (3) The period of greatest susceptibility to modification occurs when the behavior-pattern is at its threshold of rapid development. (4) Modification through exercise may occur at other than critical periods. (5) The permanency of the expansion is contingent upon the degree of fixity achieved at the time the special exercise is withdrawn.

The book contains a bibliography of 68 titles, heavily weighted with the biological aspects of twinning. Reference to the psychological literature on behavior is extremely sketchy. There are many significant omissions in both context and bibliography. Certain terminology is used with a much greater degree of assurance than our present state of knowledge would seem to justify, for example, classification of given behaviors into phylogenetic and ontogenetic, infracortical and cortical. In some respects the book is reminiscent of the days of the early biographical diaries of infants. Its rambling

notes proceed without an established point of reference in similar behaviors studied by other investigators, and thereby lose much of their significance. Since the behaviors on which the children were trained were so consistently of little practical value to the children later on, they probably were selected with that in mind. Such selection puts a different face on the problem of retention and permanence of the acquired skills than if the behaviors had been of the type that could be utilized to advantage and therefore practiced in succeeding developmental stages. The behaviors were also of the type in which the top levels of achievement were attained or nearly attained instead of allowing for later progressive growth such as might be the case in language, for example. Notwithstanding these shortcomings and the vagueness of presentation of some of the procedures and results, the book should make a real contribution in checking a too ready acceptance of the point of view that the course of development is entirely determined by so-called maturation, impervious to conditions of exercise and training.

BETH L. WELLMAN.
University of Iowa.

WECHSLER, DAVID, *The Range of Human Capacities*. Baltimore: The Williams & Wilkins Company, 1935. Pp. ix+159.

"When we compare the mathematical ability of an Einstein or the scientific intuition of a Pasteur or the poetic gifts of a Shakespeare with the correlative abilities of the average man, let alone those of a moron or idiot, the range appears well nigh limitless. Are these seemingly large differences real or only apparent? Is there a limit to human variability and if there is, does the limit differ from one trait to another or is it equal in all directions?" In these words the author sets the general problem of the book, suggesting at the same time the practical importance of the answers to these questions for ethics, education, industry, and politics. These practical matters are not elaborated, however, and the chief concern is with the presentation of certain empirical data in an attempt to demonstrate that the difference between the limits of ability are "very small"; and that the ratios between extremes partake of the nature of natural constants, ranging in value from 1.2 to 2.5 or 3, "with a further probable maximum determined by the limit of organic rate of growth, namely the important mathematical constant, 2.718 (e)".

These conclusions are based upon some 89 sets of data culled from the literature, including measures of linear traits, metabolic functions, circumferences, physiological functions, weights, motor capacities, and a few (7) perceptual and intellectual abilities. In general the

studies were chosen for inclusion where the trait in question was measurable with precision, where the number of individuals was adequate (N ranges from 40 to 97,192) and representative of the population being measured, and where conditions of measurement were sufficiently homogeneous (the meaning of this criterion is not precisely stated). The more common measures of variability are rejected in favor of the "range ratio". The scale positions of the second and 999th individual per thousand are set by determining the number of cases constituting one tenth of one per cent of the total sample. The distance between these points is the total range; the ratio of the upper to the lower point, the range ratio. Where N is considerably less than 1000 and where the distribution is known or "could be assumed" to be normal, the total range is taken to be equal to $\frac{\text{Mean} + 3\ \text{Standard Deviation}}{\text{Mean} - 3\ \text{Standard Deviation}}$. In skewed distributions the scale values of the second individuals from either end set the limits of the total range.

Since the book's main conclusions have to do with the characteristics of the range ratios considered as natural constants, the reviewer's task centers about the consideration of 2 questions: (1) To what extent can the ratios which the book presents be regarded as constant, and in what ways are they subject to possible variation? (2) What justification is there for the suggestion that the ratios of all human capacities will fall within the stated limits, with a maximum value of 2.718?

The first necessity which confronts the user of a ratio is that of knowing the absolute zero of the scale in terms of which the measures are stated, and failure to take this into account makes certain ratios wholly meaningless.[1] Although this problem does not arise for a majority of the values in the book, the author is evidently not aware of it, for he includes a range ratio of mental age without regard for the uncertain position of its zero, and even in the case of temperature measurement, for which an absolute scale is available, the results are given in Fahrenheit units.[2]

A second source of possible ambiguity in these constants is found in the necessarily arbitrary methods of setting the limits of true vari-

[1] See J. C. Chapman, Statistical Considerations in Interpreting the Effect of Training on Individual Differences. *Psychol. Rev.*, 1925, **32**, 224–234, for an excellent treatment of this problem.

[2] A typographical error in Table 12 is evidently responsible for designations of temperature in terms of Centigrade units with values ranging from 98 to 100 degrees!

ability in any given distribution. The fact that in the present study 3 different methods are employed is itself difficult of evaluation, for there is no way of discovering from the data presented which methods were applied to which data. It is certain, however, that very different values might be obtained when setting the limits by means of the second individuals from each end than when using one of the other 2 methods. Furthermore, it is difficult to believe that any one arbitrarily determined portion of the population (such as .1%) can ever be said to set the limits of significant variability in all human capacities, and it is important to remember in this connection that considerable change may be produced in the range by adding or subtracting a few more individuals at the extremes, since the differences between individuals are often greater in this portion of the distribution. There are problems for which it is necessary only to know the range within which most people fall (and the definition of 'most' is itself uncertain), but if interest lies in discovering the limits of what men can do or be, frequency of appearance of intermediate magnitudes of an ability may be largely irrelevant. Certainly this is so if one starts out with the interesting problem of the difference between an Einstein and an idiot.

The author recognizes and discusses the fact that the nature of the group selected for measurement is a factor affecting the size of the range ratio. It is questionable, however, whether the difficulty has been handled satisfactorily, for it appears that any decision as to what factors are to be equated when choosing an experimental group is more or less arbitrary, since there are always other factors which might have been controlled with consequent changes in the range ratio. In general the author has selected studies where age, sex, and race of the group are the same. It has evidently proven impossible to adhere strictly to these arbitrary criteria in all the studies, however, for other limiting factors are clearly operating in certain sets of data. The results taken from Burt's study,[3] for example, provide a range ratio based on the mental ages of 200 "normal" London school children, 9 to 10 years of age. The mental ages of defectives are excluded and reported as an entirely separate group. It is difficult to attribute any but limited and highly specific significance to a constant derived from such a group, for even in advance of curtailing the extremes by the definition of the range, an important part of the distribution of mental ability has been omitted by this process of selection.

[3] Burt, C., *Mental and Scholastic Tests.* London: King and Sons, 1922. Pp. xv+432.

This problem is really one aspect of the basic fact that no one is as yet able to define the boundaries of the traits and capacities whose limiting values are being sought, a fact which casts serious doubt on the values. To what extent, for example, is card sorting the same trait before and after practice, and where does "simple learning" leave off and "hard learning" begin (Table 15)? Under what latitude of conditions, inside and outside the organism, are reaction time measurements to be considered measurements of the same trait? The manner of answering these questions will surely alter the constants in question, but the book does not concern itself with the problem. "Capacity", which is regarded as a synonym of "ability" and "trait", refers to any measurable magnitude or event in the organism without reference to special conditions of its occurrence or its unity. The limits of a trait are set by the wholly fortuitous circumstances under which an experiment happened to be carried out.

It remains to discuss briefly the evidence regarding the assumption that the size of the range ratios of all human capacities will prove to be limited by a maximum value such as *e*. The first and most obvious comment to be made on this notion derives from the data of the present study. In spite of the limited number of human capacities included, at least 5 of these values are greater than the suggested limit. In view of the progressive and continuous increase in the size of the ratios as the capacities studied become more and more complex, a point which the book confirms, it is difficult to doubt that many ratios greater than the suggested maximum will be found. We offer but one suggestive example taken from Lemmon's investigation of the relation of reaction times to intelligence.[4] This piece of research comprises the measures of reaction time under 6 different conditions, ranging from simple (which Wechsler includes in his tables) to complex. The number of subjects is the same for each condition and there is nothing in the study to suggest that any part of the data is more or less accurate than any other part, except that the reported reliability coefficients are higher for the more complex conditions. We have calculated[5] the range ratios for the 5 sets of reaction time

[4] Lemmon, V. W., The Relation of Reaction Time to Measures of Intelligence, Memory, and Learning. *Arch. of Psychol.*, 1927, **15**, No. 94.

[5] Though the tables do not specify which method of calculation of the ratio has been used in each case, it appears from the value of the ratio on reaction time, that the formula $R=\frac{M+3S.D.}{M-3S.D.}$ has been employed. We have, therefore, calculated the remaining ratios by the same method.

results not included in the book and find them to have the following values: 1.88, 2.29, 3.32, 5.38, and 13.2. Though the psychological functions are simple when compared to other important functions not yet studied, 3 of these ratios far exceed the proposed maximum. In view of such empirical evidence on the subject, discussion of the *a priori* justifications for assuming such a maximum may be dispensed with at this time.[6]

Attempts to bring together and to organize widely disparate facts are always stimulating and suggestive, and the present book is no exception to this statement. Furthermore, it is very important that psychology should be increasingly concerned with the systematic aspects of variability. Our adverse comments have been intended chiefly to direct attention to certain serious limitations of the available methods of measuring variability and the conclusions derived therefrom. These comments obviously do not preclude the possibility that, when these difficulties are overcome, an approach to the problem of variability such as proposed may prove to be of genuine value for psychology, in so far as the constants derived thereby are shown to have significant relationships. Meanwhile, there is need for much careful work on the conditions of variability, with full recognition of the limitations imposed by *any* method and a consequent attitude of healthy skepticism toward numerical values which tend to "give themselves airs" unwarranted by their origin.

HELEN PEAK.

Randolph-Macon Woman's College.

HOISINGTON, LOUIS B., *Psychology: An Elementary Text.* New York: The Macmillan Company, 1935. Pp. xxi+557.

The writer of an elementary text in psychology is confronted with the double problem of making his book sufficiently technical and experimental to be an adequate introduction to psychology as a science, and at the same time of making it practical enough and near enough to the vital problems of younger students to meet their needs. The result is inevitably a compromise, as to subject matter, emphasis, and style. Some chapters are filled with well grounded experimental results, while others draw a good deal upon the imagination and common sense thinking of the author. In fact, the chapters that have the greatest appeal for many students are often of the latter sort.

[6] The theoretical deduction of the value, 2.718, which was given in an earlier article (*Psychol. Rev.*, 1932, 39, 87–90) is not included in the book.

Some psychologists complain that it is unfair to the student to present to him in a supposedly scientific textbook what he already possesses as common sense knowledge about human nature, and merely to dress it up in a technical lingo. They maintain that a psychology text should be no more talky than a physics text. This is probably true for the superior student whose interest in psychology is of the sophisticated sort. But the body of experimentally established material leaves the majority of beginning students cold, and with their main problem, which has to do with the control and understanding of their own personalities, unsolved.

Another problem for the writer is the question of the proper distribution of emphasis on topics; *i.e.* how much to place on the traditional fields of sensation, etc., in which the largest body of experimental data is found, but which most of us feel has been vastly overcultivated, and how much to devote to more recently developed and "liver" fields. Incidentally it is fatal for an elementary textbook writer to adhere to some one of the psychological "schools". The student emerges with little more than a lot of violent prejudices and taboos, such as the nausea which one trained in radical behaviorism develops for the word "mind".

Dr. Hoisington, in constructing his book, has obviously considered all of these problems, and has deliberately chosen to write for the average student, who believes he has a "self", who worries about his "inferiority complex", who thinks in terms of "will" and "purposes", "conscience", and "life ideals", and wants to know just what all these concepts are, when restated in the technical lingo of the psychologist. Even "character" and "moral conduct" come in for consideration. But Dr. Hoisington has not neglected another type of average student, the one who is curious about a lot of puzzling, "spooky", borderline phenomena, that seem to the uninitiated to defy scientific analysis, and that, as long as they are ignored, leave open the field for charlatans of all sorts to prey even on college graduates. So we find space devoted to hypnosis, mind-reading, dreams, telepathy, etc.

In spite of its appeal to the average student, the book does not neglect to set forth what the author considers a minimum essential of established scientific theory and experiment. In developing this, Dr. Hoisington has held to the concept of the integrated organism, in whom sensory processes are not isolated events but are aspects of the total integrated system of responses. Following out this line of approach, he attacks, first, the kinds of response patterns, reflexes,

determining tendencies, qualitative reactions, ideas, affects, emotions, traits, capacities, etc.; second, the way in which these response patterns develop; third, the manner in which they are retained; and fourth, how they are used in thinking, working, and playing. Thus, by the time he is ready to discuss will, purpose, and the like, the author has built up a technical lingo in terms of which to define these popular concepts.

One is not irritated, in reading the book, by the feeling that the author is a protagonist for some "school". He has advanced a long way from his structuralist background. The chapters on mind and nature and on man as a machine give a good philosophical orientation for the student.

How evaluate the book? It ought to appeal to teachers of average college students, whose interests are non-technical and whose demands for rigid scientific material are not extensive. But, for the teacher of hyper-critical, mature, or sophisticated students, the book would not be so well adapted. Whole chapters would have to be skipped over. As a matter of fact, this would not leave any dearth of material because the book is quite extensive without them. But the sophisticated student would get the impression of being talked down to, of moral precepts being sneaked over on him.

The conclusion seems to be that there is no one ideal form for a beginner's text in psychology. It depends so much on who the beginners are. It is well that texts written in the manner of Dr. Hoisington's are available, and it is well that texts of quite a different type are also available.

ARTHUR G. BILLS.

The University of Chicago.

GRIFFITHS, JOSEPH HARRY, *The Psychology of Human Behavior.* New York: Farrar and Rinehart, Inc., 1935. Pp. xxi+515.

Although the number of textbooks of general psychology mounts steadily from year to year, the publication of another such book is still of major interest to psychologists. The interest is conditioned not by an expectation of seeing a new array of facts, but rather by a hope for a new systematic ordering of the facts or new insights on the side of theoretical interpretation. Furthermore, one may manifest an interest in a new textbook of psychology because of its effectiveness as a pedagogical instrument. Presumably, *The Psychology of Human Behavior* by Joseph Harry Griffiths, professor of psychology at Lawrence College, aspires to attract attention because of the latter

consideration. For in the preface of the book, the author writes: "In plan and contents the present book reflects the experience gained from a dozen years of teaching elementary psychology to college students. A significant part of this experience comprises the reactions of students both to the study of psychology itself and to different ways of presenting the science. These reactions, to the instructor who is and remains sensitive to them, furnish an invaluable check-up on the effectiveness of methods of presentation."

The book is divided into 6 parts. Part I is entitled "What Psychology Is" and contains 2 chapters dealing with psychology's origin and development and ways of psychologizing (methods). "The Psychology of Learning" is the title of Part II, and the 5 chapters in this part treat, respectively, the topics how we learn, how to learn effectively, intelligence: what it is and how to measure it, what determines intelligence, and practical and theoretical aspects of intelligence testing. Emotional behavior is the subject matter of the 2 chapters in Part III, bearing the title of "The Psychology of Feeling and Emotion". Part IV is labeled "The Psychology of Thinking and Imagining", with one chapter each on thinking and imagining. Three chapters on sensing and perceiving and perceiving and attending constitute the subject matter of Part V, "The Psychology of Perceiving". Part VI, "The Psychology of Personality", concludes the book with one chapter on personality. The total number of chapters in the book, therefore, is 15.

So far as the organization of the material of a textbook is concerned, a reviewer may be prone to make evaluations in terms of his own biases. One may prefer a particular organization, yet at the same time recognize that there is logic behind a variety of organizations. While the reviewer might not agree with the particular sequence of topics (*e.g.* one might ask why thinking and imagining before sensing and perceiving), yet the systematic orderliness of Professor Griffiths' book, as well as its clarity of organization, is superior to a number of successful textbooks in general psychology. In the opinion of the reviewer, its orderly treatment of the topics of psychology is one of its outstanding merits. For this reason, my prediction is that it should prove to be a very teachable book and should also provide the student with a satisfactory background for further reading and study. It may be added in this connection that the book is well written and relatively free from typographical and other errors.

At the end of each chapter one finds a series of questions for dis-

cussion and 2 lists of references. The first list represents the sources and the second is one of supplementary readings. The list of authors and references is catholic in range, although there are a few important contributors to psychological knowledge who are conspicuous by their absence. There is both a subject and an author index.

Regardless of the title, the point of view of this book is eclectic. Both conscious and behavior data are included, with Gestalt interpretations thrown in for good measure. Despite the structural traditions of the author, one senses rather strong leanings toward Gestalt interpretations, an observation which has been made with reference to several others of this tradition, which, incidentally, may be of interest to the psychological historian. A clean-cut definition of the subject matter of psychology is not given; however, the author stresses the understanding of behavior *as* behavior, or "*the activity of an organism taken as a concrete whole in interdependent relationships with environmental conditions*".

The reviewer has few damaging criticisms which are worth mentioning in a brief review. While the book is not a major contribution to systematic psychology or to psychological theory, yet the author has done well what the reviewer conceives that he (the author) has set for himself as a task. He has written a book that is clear and concise and one that should give the beginning student a successful orientation. And because of the methodical treatment of psychological materials, the reviewer believes that teachers of psychology will find in this book a useful pedagogical instrument.

PAUL L. WHITELY.

Franklin and Marshall College.

SKAGGS, ERNEST BURTON, *A Textbook of Experimental and Theoretical Psychology.* Boston: Christopher Publishing House, 1935. Pp. 426.

This new textbook is a mixture of old tradition and recent material. Few texts today would contain a parallel to the following passage: "A percept stands intermediate between sensation and idea. It will be recalled that a percept involves both sensations and images. The idea differs from the percept only in that it does not involve peripherally aroused sensations as part of its structure. It involves only groupings of images and meanings" (p. 230).

The favoring of physiological explanations, which places the anatomical chapter next to the introduction, leads to assertions about synapses in relation to learning, and to the introduction of numerous

diagrams showing the rearousal of neurones in producing images, the shunting of impulses in conditioning, the interplay of neurones in attention. The author's dependence upon a hypothetical physiology is epitomized in the following statement regarding the drainage theory: "While the theory is highly speculative and largely rejected by physiologists, it goes far to account for many psychological facts" (p. 153).

The 19 chapters cover a wide range of topics. In addition to the usual ones, there is a chapter on work, fatigue, and efficiency, and one on sleep and dreams. The final chapters on individual differences and personality, covering together but 22 pages, are less thorough than in other recent books.

The physical attractiveness of the text is marred by the large type-face chosen for the sub-headings, and by the poor draftsmanship used in preparing the figures.

The author has searched a broad field of literature in preparing the book, and it reveals a commendable range of interest and knowledge.

ERNEST R. HILGARD.

Stanford University.

SKINNER, CHARLES E. (Editor), *Readings in Psychology.* New York: Farrar and Rinehart, Inc., 1935. Pp. xi+853.

This book is a compilation of approximately 600 excerpts from 267 authors. The materials are grouped in 26 chapters as follows: The General Nature of Psychology, H. Schlosberg; The Methods of Psychology, R. T. Rock, Jr.; Some Principles of Behavior, J. F. Dashiell; Psychology of Individual Differences, L. D. Crow; Intelligence, P. L. Boynton; Personality, G. Watson; Heredity and Environment, W. C. Trow; The Maturation of Mental Functions, N. Bayley; The Nervous System, F. H. Lund; Receptors and Their Relation to Adjustment, C. R. Griffith; Effectors and Adjustment, C. L. Prosser; The General Problem of Learning and The Laws and Principles of Learning, D. B. Leary; Memory, C. M. Smith; Motivation, C. M. Diserens; Feeling and Emotion, C. A. Ruckmick; Attention and Discrimination, J. P. Guilford; Perception, A. W. Aleck; Imagery and Imagination, M. Schoen; Thinking, E. Heidbreder; Volition, J. J. Ryan; Social Institutions and Social Behavior, K. Young; Conditions of Efficient Work, B. V. Moore; Applied Psychology, J. D. Weinland; History of Psychology, W. B. Pillsbury; Contemporary Schools of Psychology, C. E. Ragsdale. "Full respon-

sibility for the choice and arrangement of the chapters in this volume rests upon the general editor. The responsibility for the selection, organization, and treatment of the source materials and for the original material in each chapter rests with its contributor."

"The selections in each chapter are arranged according to logical sequence. Introductions are supplied at the beginning of the chapter and as needed in presenting the various subtopics, and to facilitate the use of the book, the excerpts in each chapter are numbered and completely documented, exercises and references following each chapter." (All quotations from the preface.)

"The excerpts . . . were selected on the basis of their usability and value to beginning students, either when used as a text or as supplemental readings . . ." "Instructors using the volume will find it possible to assign the chapters in any order desired." "The editors have included a considerable portion of recent material, both expository and experimental in character." Most of the excerpts are taken from articles appearing in the professional journals or from books written for the advanced student. The reviewer in no way questions the value of the articles or books, but when a small excerpt is taken from such sources and without adaptation presented to the beginning student, it is in the reviewer's opinion too much to expect that the beginning student will find it of much value. There are, it is true, a few adaptations; there are many excerpts within the range of comprehension for the beginning student; and it is desirable to make the beginning student aware of some of the more complicated and difficult problems with which psychology deals, but the reviewer seriously doubts whether a large portion of the material is usable by beginning students. Certainly as an instructor he would not consider plunging the student into chapters 3, 5, 9, 10, 11, 15, 18, 19, 20, or 21 as a starting point, and he would assign these chapters at any time with some fear and trembling.

"Since the contributing editors represent many viewpoints, it is only natural that there would be some lack of uniformity in the choice of materials. Some excerpts are short; others are long. Some chapters contain materials primarily of an expository character; others include a large amount of experimental literature." This lack of uniformity would perhaps appeal to many instructors, while it would cause others to disapprove of the volume as a possible text and would be considered as destroying in part the usability of the volume for beginning students. Any one psychologist is likely to be disappointed by certain emphases and omissions, particularly of topics in which he

is most interested, but as a whole the volume is a good sample of the problems of psychology and of what psychologists are doing in an attempt to solve these problems.

CARL N. REXROAD.

Stephens College.

SEASHORE, CARL E., and SEASHORE, ROBERT H., *Elementary Experiments in Psychology.* (Second Edition.) New York: Henry Holt and Company, 1935. Pp. vii+219.

This volume is a "modernization" of Seashore's well-known elementary laboratory manual. Both format and content have been greatly changed in the new edition, in conformity with recent trends in the publication of such works. The pages are 8 by 11 inches, with 2 columns to the page, and with perhaps a general improvement over the older book in typography.

The second edition contains 42 chapters, or experimental problems, whereas the first had only 16. Only one topic treated in the latter—affective tone—is omitted in the new edition. The additions occur mainly in the fields of personality "measurement", learning, and motor activity. The important fields of learning and memory, represented by only 4 experiments, are perhaps underemphasized, especially when contrasted with those of motor activities and vision, to each of which 6 chapters are devoted. A dearth of references and the lack of systematic arrangement of those included are unfortunate features. The greater part of the material is presented in an interesting manner, and the new edition will likely emulate the old in being one of the most usable manuals available for elementary laboratory instruction in psychology.

LYLE H. LANIER.

Vanderbilt University.

GRAY, J. STANLEY, *Psychological Foundations of Education.* New York: American Book Company, 1935. Pp. xiii+534.

This book is designed as a text in education or educational psychology for students who have had a beginning course in general psychology. It is an unusual book in many respects. It does not follow at all closely the more traditional subjects of any previous texts in the field. Many topics ordinarily considered very important are given small space or omitted altogether, and several controversial matters which are usually touched upon only lightly or omitted are here singled out for considerable discussion. About half of the

volume is devoted to certain problems in psychology and the other half to problems ordinarily considered in a course in principles of education. The author has daringly attempted to bring the content and viewpoint in these two fields together in one book and to have a unifying idea run throughout. To accomplish this purpose he has unquestionably investigated a wide range of literature and has tried to think through to the foundations of education. One notable success of this attempt has been to place the emphasis in education not on methods, not on the teacher, not on administration nor any of the super-structure of education, but upon the learner. If the volume does no more than stimulate teachers and prospective teachers to think of education in terms of the learner, it will be a welcomed addition to the family of textbooks in either educational psychology or principles of education, and will to some extent measure up to its ambitious title.

The very difficult task which the author sets for himself is well expressed by him in the preface when he says that he "has used the concepts of objective science as criteria by which principles of education were evaluated and re-interpreted. A new philosophy of education has been developed in harmony with the postulates and conclusions of scientific psychology." On the first page of the first chapter he uses the words "science", "scientific", and "scientist" 8 times, and throughout the first half of the book the author weakens his presentation decidedly by inferentially suggesting to the reader that a thoroughly scientific foundation for education will be laid.

He reviews in his first 50 pages the different systems of psychology which exist or have existed. Early in his treatment of the various points of view he lets his reader guess the end of the story, namely that thorough-going behaviorism is the only defensible "foundation" for psychology or education, and thus the naïve reader gets the impression that it is hardly worth while to read about the unworthy ideas and facts which have been dealt with by other schools of psychology. The eclectic viewpoint as a basis for psychology or education comes in for an especially severe reprimand. Referring to Woodworth, he says:

"Some writers believe they can maintain a 'middle of the road' position and not adhere to any special point of view. This is utterly impossible. A chemist cannot be half alchemist. An astronomer cannot be half astrologer. Neither can a mechanist be half vitalist. Of course such an eclectic view is not subject to the criticism of either the vitalist or the mechanist. It appears to 'carry water on both shoulders'. Also it appears to naïve readers as a

'broadminded' and 'liberal' view. However, the 'middle of the road' view is an example of sloppy, unscientific thinking of the typical transition psychologist. It is a position which is sufficiently ambiguous to enable him to pretend to favor the popular belief in vitalism and also to escape the criticism that he is unscientific" (p. 37).

The reviewer could only shed a sympathetic tear for those who were more interested in facts than in theoretical systems, but he hastened on to the end of the chapter gathering three ideas, namely, that the psychological foundations of education must be scientific, mechanistic, and based on the postulate that children do not have "minds". "Perhaps we have minds", says Gray, "but until it is demonstrated, we shall omit that postulate from our basic position" (p. 40). It seems possible that the naïve educator reading this book may be a bit disturbed by this assertion that we do not have "minds", and it seems that the author might have forestalled possible misunderstanding (not to mention loss of sales) among educationists by defining what he meant by the "mind" which does not exist.

In the next few chapters many controversial questions—such as free-will, the soul, heredity *vs.* environment—are brought up and debated. The various theories of emotion are discussed, and we are told that:

"Emotions can be explained in a purely scientific manner. It is not necessary to postulate non-physical phenomena to interpret those 'affective states' which accompany the more obvious emotional behavior. Emotion is simply a type of behavior in which the endocrine glands secrete hormones into the blood and thereby change its chemistry to such an extent that the organism *feels* the change" (p. 130).

Upon reaching Chapter 6, which deals with the topic of learning, the reviewer felt that here at last some experimental data would be presented, none having been given in any detail up to this point. But alas! The discoursing of the author continued as before. Much space was devoted to arguments to prove that "Thorndike's explanation of learning was . . . inconsistent with biological progress and inexplicable in terms of his own S–R bond postulates" (p. 206). Gray's magic wand emblazoned with the word "unscientific" is neatly waved over every theory which does not come up to his criterion, but nowhere with greater finesse than over the Gestaltist's idea of insight. He says:

"To say that learning consists of a peculiar vitalistic function called insight is to transcend the limitations of objective science. . . . To say that learning involves changes in *perceptual* surroundings and that these constitute reality is

a *solipsistic* position which will not permit scientific research nor social coöperation. The gestalt view of learning is interesting but of no scientific nor sociological value" (p. 182).

The "biological explanation" of learning is strongly supported by the author. In answer to his own question as to what method of behavior modification is implied by the biological explanation, he says:

"It is quite evident that modern biology has added nothing essentially new to the common sense conception of learning. The conception that the organism learns to do by doing is by no means new in the history of human development. However, biology has added evidence and has made a naïve idea scientific" (p. 194).

To the very important problem of transfer of training only 8 pages are devoted. A few experiments are mentioned, for a change, but usually only one or two sentences are given to each. The majority of the space is devoted to a debate on Thorndike's theory of transfer, which the author finds to be unsatisfactory. Gray's own view is that an organism always functions as a whole and therefore all learning is body-wide. "Thus", he says, "the explanation of transfer of training ceases to be a difficulty. . . . Alteration of any part of the organism affects the organism-as-a-whole and 'transfers' to all subsequent behavior. There is no problem as *to what* training transfers. *All* training transfers . . . " (p. 204).

In the above manner one topic after another is taken up, talked about, and discussed *ex cathedra* with almost no reviewing of the experimental data and little stimulation to further study of the facts on the topic.

The second part of the volume is very different from the first. It deals with the nature of education, and except in the case of two or three chapters very few psychological problems are raised. This part of the book follows somewhat more closely than does the first part the traditional topics. The influence of Bode, Dewey, Kilpatrick, Chapman, and Counts and other leaders in non-psychological branches of education is clearly marked in the philosophy and methods recommended. Little evidence is found by the reviewer of the evolving of the "scientific philosophy" which was promised in the preface of the book. Instead of finding a unifying set of psychological principles running throughout the volume we find what seem to be serious contradictions at several points. For example, in the second part of the book the author speaks of the great importance of "the recognition of a problem" on the part of a learner, whereas in the first part he gives us the impression that "recognition" is an aspect of "mind"

and should be classified as non-physical data and hence unscientific and probably non-existent. At one place he thinks that children should be taught to engage in religious practice, while much earlier in the book he had spoken rather harshly of educators mixing religion into their thinking. "Objective psychologists", he had said at the outset of his discussion of the nature of education, "have been slow to apply their beliefs to education—perhaps because educators have been so antagonistic. The average educator cannot divorce his religion from his psychology and so refuses to consider any psychology devoid of 'faith data'." Gray recognizes the possibility that some of his readers may think him inconsistent in recommending any attention to religious practice in education, and he defends his position by what seems to be a recommendation of thinking in logic-tight compartments. He says:

> "In Part I, we have tried to explain that religion, which is based on faith data, has no place in science. Science does not include non-physical or faith data in its basic postulates. However, most scientists are also religious. They ignore religion in their science, but their lives are not limited to science. They are not always scientists. They have faith in the reality of that which science cannot prove. This is not being inconsistent. It is merely living a part of life outside the dictates and logic of materialistic science."

Gray has written with vigor and clarity. He has wrestled openly with many more controversial issues than the average writer in the fields which he is covering. As a textbook for the average college student it is not likely to stimulate much interest in factual study. As a treatise for specialists in the field it is rather unique in the sharpness of its distinctions and the boldness of its statements. It has an abundance of sentences which will serve as convenient targets for those who like a battle.

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STROUD, J. B., *Educational Psychology.* New York: The Macmillan Company, 1935. Pp. xi+490.

Every author of a textbook in educational psychology is faced with two problems. The first is one of selecting subject matter which is not included in most textbooks of general psychology. The second one is that of selecting from material which falls well within the field of educational psychology those topics which are most appropriate for such a textbook.

In attempting to dissolve the first problem the author considers

educational psychology to be that body of knowledge "which treats of those facts and principles which are basic in educational theory and practice". Such a definition, however, does not limit the field, for one is left as much at sea as ever in determining the facts and principles which are basic in educational theory and practice, and which at the same time are the particular domain of educational psychology. Accepting this definition, one would include much of the material given in the textbooks in general psychology, for certainly this material is basic to educational theory and practice.

It appears that this is the author's point of view. When one reads the "contents" of the volume, he is struck with the similarity of the chapter headings to those given in such textbooks as Carr's *Psychology*. For the most part the subject matter discussed is that of general psychology with its application to educational theory and practice. Evidently the author holds that a thorough knowledge of the "Instinct Hypothesis", "The Emotions", "The Physiological Basis of Human Life", "Elementary Statistical Concepts", "Work and Fatigue", "Learning", "Retention and Recall" (these are chapter headings), is basic to educational theory and practice. In holding to this point of view the author is in excellent company. Thorndike (to whom the author acknowledges his indebtedness) in his classic 3 volumes reviews in detail most of the experimental literature available at the time in these fields. That some of these are basic most psychologists would agree. The questions which the reviewer would raise would be in regard to the relative value of the topics for educational theory and practice, and whether it should not be assumed that most students who take courses in educational psychology have already covered some of these topics sufficiently well to enable them to go on and browse in new fields.

There seems to be a wide divergence of opinion among authors in regard to what should be included in a textbook on educational psychology. Fletcher[1] stresses the importance of the "creative or expressive side of mental life" and discusses such problems as the relation of mental hygiene to education, "Genius and Mental Pathology", and "Education as a Social Process". Griffith[2] attempts to maintain a balance between a systematic presentation of the results of laboratory research and emphasizing instances drawn from the

[1] Fletcher, J. M., *Psychology in Education.* New York: Doubleday, Doran and Co., Inc., 1934. Pp. xx+524.

[2] Griffith, C. R., *An Introduction to Educational Psychology.* New York: Farrar and Rinehart, Inc., 1935. Pp. xiv+754.

daily life of teachers. He endeavors to present the "whole pattern of growth". Cameron,[3] on the other hand, after a discussion of the subject matter of general psychology in which he shows its application to education, devotes about 100 pages to a presentation of the psychology of the various subjects of the school curriculum. In Trow's[4] book "the recurrent theme which gives unity to the whole is adjustment". He omits as irrelevant a discussion of the neurological aspects of behavior and includes chapters on "Growth" and on "Social Learning and Character Education". The author of the text under consideration includes, besides those subjects already mentioned, chapters on "Factors Influencing Speed of Learning", "Some Educational Measurements", "Development of Personality", "Studies in Personality", and "Some Educational Problems". It is clear from the enumeration of these chapter headings that the author maintains the classical and conventional point of view. The reviewer is more inclined towards the point of view expressed by Fletcher, and consequently would favor the inclusion of subject matter which has more specific educational and social bearing.

However, the value of a textbook depends not only upon the subject matter discussed. It depends as well upon the clarity of thought and expression, the keen insight, the critical judgment and the breadth of information of the author. In these respects the book, in the opinion of the reviewer, is unsurpassed. The author has shown rare ability in summarizing most of the recent experimental literature in the field, and in maintaining a critical attitude towards the results. Moreover, the method of presenting the material is such as to encourage that which most good teachers seek—a critical attitude on the part of the student. For those instructors who accept the point of view that a course in educational psychology should give the student a sound psychological background, some appreciation of the methods of psychological research, and the ability to evaluate critically psychological data, this text should be an invaluable aid. From this point of view it is one of the best presentations since Thorndike's 3 volumes.

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[3] Cameron, E. H., *Educational Psychology.* New York: Century Company, 1927. Pp. 467.

[4] Trow, W. C., *Educational Psychology.* Boston: Houghton Mifflin Company, 1931. Pp. 504.

FITE, WARNER, *The Platonic Legend*. New York: Charles Scribner's Sons, 1934. Pp. viii+331.

Lytton Strachey once observed that the salt of criticism is very likely to increase the value of a history, and he cited many telling instances. By this standard *The Platonic Legend* has at least one ingredient of a worthwhile book: Mr. Fite openly admits that he finds Plato "rather repellent". Yet, far from lessening the merit of his volume, such an approach gives the study of Greek thought a new lease of life. Something over a century ago Thomas Jefferson and John Adams agreed that Plato's dialogues were full of "whimsies, puerilities and unintelligible jargon" but such refreshing reactions have been rare, and we are indebted to Mr. Fite for turning the dry light of critical analysis upon a man who has seldom been regarded as less than divine. Moreover, in addition to being a critique of Plato, this book is in some measure the biography of a reputation. We have had "de-bunking" biographies of several notable citizens of the world but these have been largely concerned with pointing out that patriotism pays, and pays well, or that blasphemy and even lechery touch the lives of the great. We have not had a philosopher and his reputation resolved into those multiple elements of which the whole was made. It is not suggested that Mr. Fite has transformed Plato into a pitiful purveyor of Brisbanalities; but he has stripped away the divinity that doth hedge, in this case, a philosopher-king. Particularly, he has distinguished between the historical Plato and the traditional Plato, between the Plato of fourth century Greece and the Plato of Shorey, Inge, Taylor, More, and Jowett.

He first concerns himself with Plato the political theorist because nearly half of Plato's writings are directly political and because, since Plato did not distinguish between politics and ethics, his moral and social theory is accounted for in his political theory. Due to the all-inclusive character of that political theory and also to its intrinsic nature, Fite believes that the "Soviet state is the first attempt in history to realize Plato's conception of a state". Far from aiming at a democratic ideal, Plato sought the creation of an authoritarian community in which control was limited to the Platonically designated "rich, well-born, and able". For him the masses constituted an evil, and liberty a menace. When the Athenians failed to appreciate this attitude and ignored its exponent he took refuge in an adolescent pessimism.

In the matter of morals and ethics, Mr. Fite argues that Plato was inspired only by a political and scientific purpose and subordinated

every consideration to the achievement of his aristocratic polity. The regimen which he would have imposed was "that which the horse-breeder imposes upon his blooded mare when he keeps her away from all stallions not of his choosing". Platonic love, boy-love, is declared by Mr. Fite not to have represented the general Athenian practice at all but rather to have been the foible of the "smart set" and as such cordially opposed by the majority, a conclusion certainly more warranted than the prevailing notion that boy-love was typical.

Plato as artist also comes in for considerable attention, and with this his method is analysed, since for him method was scarcely less significant than doctrine. In this connection Mr. Fite declares that the mind of Plato "was not so much the mind of a poet as the mind of a mathematician; possibly indeed the clearest instance in the history of thought of what is called 'the mathematical mind'". If he returned to earth today his ideal philosophers would be Einstein, Jeans, and Millikan, not Kant or Berkeley. As artist, Mr. Fite finds Plato lacking both taste and maturity. His characters frequently talk like smart undergraduates and in this they compare unfavorably with the speakers in Lowes Dickinson's *Modern Symposium;* and his dialogues represent no such high artistic achievement as the works of Shakespeare and Goethe. His art "is not so much the natural flowering of his thought as an elegant robing for it".

It is impossible to go on with a detailed résumé of this book, but it can be said that scarcely a page lacks some stimulating comment. Whether Mr. Fite with extensive quotation and reference in revealing Plato the thinker as superficial and often naïve or Plato the artist as the beneficiary of Jowett or Plato the man as unimportant, is just or unjust—and refutation will be difficult—we must be grateful to him for compelling us to re-examine Plato. There will be fewer silly utterances about this philosopher henceforth. His disciples will be less loath to make him fit their ideal and to explain away inconsistencies and immaturity on the ground of irony and playfulness. It may be that in time to come we shall realize that the first neo-Platonist was not Plotinus but a North German squire whose method and whose dogmas bear a striking resemblance to those of Plato. *Der Untergang des Abendlandes* in many ways is the sequel to the Platonic dialogues.

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DUNCKER, KARL, *Zur Psychologie des produktiven Denkens.* Berlin: Julius Springer, 1935. Pp. vii+135.

The present volume takes its place in a long series of attempts, beginning with those inspired by Külpe at Würzburg, to study the higher mental processes by introspective technique. The experimental procedure is simplicity itself. Observers are asked to solve problems and to describe the steps by which they arrived at their solutions. The protocols thus secured furnish the raw materials for the experimenter to use in whatever way he can. Apparatus, checking and control of single variables, ordering and timing of stimulus-presentations, statistics, etc., are either entirely absent or reduced to the barest minimum. In this country such procedures reached their culmination in the work of Baird and his students, but have since fallen into almost complete disuse, if not disrepute. There is therefore nothing on the side of experimental technique to save Duncker's work from the criticisms which were long ago levelled against the Würzburg methodology. The value of the present monograph must accordingly be sought in the speculative insights which the author is able to offer.

Productive thinking, if the reviewer has understood Duncker at all correctly, consists primarily in the restructuralization of the materials with which the thinker has to deal. The restructuralization is accomplished in various ways, most of which are revealed by the protrusion out of the total configuration of specific meaningful and logical relationships, such as whole-part, similarity, opposition, closure, perceived causal connections, fitness, utility, etc. Whether the relationship appropriate for the solution of a given problem appears or not depends upon the degree to which it is embedded in irrelevant palpable materials which might obscure its functional adequacy. If some *aspect* of the material can be made available which is instrumental to the *goal* set to the thinker by the problem, *resonance* is established between the two terms. Duncker, in fact, labels his view *"Die Theorie der Lösungsentstehung auf Grund der Resonanzwirkung eines Signalements".*

German *Denkpsychologie* would profit by the use of the critical tools of logical positivism or operationalism. Ever since the Würzburg days various authors have been improvising verbal concepts which are exceedingly difficult to differentiate in terms of any experimental procedures. Let us take three typical examples: Ach, Selz, and Duncker. Ach insists that the critical relation between *Bezugsvorstellung* and *Zielvorstellung* is established by means of *determinierte Abstraktion.* Selz objects to Ach's *Konstellationstheorie,*

and argues that the *schematische Antizipation* of the critical *Zielvorstellung* is a direct and specific reaction, by way of *Gleichheitserregung,* to the *Bezugsvorstellung,* acting as a releasing stimulus. For such a relationship Selz prefers the phrase *reflexoidale Zuordnung.* Duncker is apparently in agreement with neither Ach nor Selz. But the disagreement seems to be mainly verbal. For *schematische Antizipation* he substitutes the preferable word *signalisiert,* and in place of *Gleichheitserregung* he uses the better word *Resonanz* (p. 22). Productive thinking, then, according to Duncker, is explained by the "*Resonanzwirkung eines Signalements*".

It is clear that for Ach the course of thought is primarily determined extra-psychologically (*i.e.* physiologically, or by way of *Aufgabe*). For Duncker topographical determination assumes a larger rôle: the relations are intrinsic to the phenomenal material itself. Beyond such differences of emphasis, however, the divergencies between Ach, Selz, and Duncker strike the reviewer as largely verbal, and to that extent scientifically meaningless. A scientific concept derives its meaning from the observational and experimental operations which have been performed to arrive at it, not from definitions in terms of other words.

Duncker's book suffers from the lack of an index. There is also no bibliography. Citations to literature are given in the text and in footnotes, but in some cases they are almost useless because of the absence either of year, or of volume, or of pages,—or occasionally of all three. Not infrequently a reference is so far removed from a subsequent *a. a. O.* that the reader, unless he has held the page of the original citation in memory, can only find it after prolonged search.

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KLINEBERG, OTTO, *Race Differences.* New York: Harper and Brothers, 1935. Pp. ix+367.

This volume is addressed both to serious students of race differences and to "intelligent laymen" who may wish to develop an enlightened point of view with respect to racial problems. An introductory chapter considers the main historical theories of race differences, but dismisses them on the relevant grounds that they are mainly subjective theorizing. The author correctly observes that scientific information concerning race differences can be secured only through the objective investigations of "anthropologists, anatomists, physiologists, clinicians, psychologists, sociologists, and others". The

rest of the volume is devoted to a review of the hypotheses and investigations in these various scientific fields. The comprehensive nature of the book is suggested by the following divisions into which the subsequent chapters are grouped: (1) the biological approach, (2) the psychological approach, (3) the cultural approach.

The first section opens with an examination of the concept of race. Although no undisputed criteria of race exist, Klineberg accepts provisionally the classification used by many anthropologists, namely, that of Negroid, Mongoloid, and Caucasian races. He emphasizes the fact that the identification of race with either language or nation is fallacious (*e.g.* the "Aryan" race, or the "German" race). Evidence for the instability of physical types in different environments is discussed, but Klineberg cautions the reader against the conclusion that plasticity is unlimited. Finally, he fails to find any basis for assuming an hierarchy of races with respect to 'primitivity'.

The remaining chapters in the biological section consider biochemical differences, developmental differences, the relation of physique to mentality, and physiological differences. These chapters are very good, quite apart from the problem of race differences, since they present in concise fashion a mass of material bearing upon problems in general psychology. Klineberg fails to find evidence in any of these fields which justifies a 'racial' interpretation. With respect to biochemical factors, neither blood, glandular, nor morphological 'types' are found to be correlated with race. It should be noted, however, that the identification of three distinct races implies biological 'types', in some sense, and the fact that elementary organic factors characteristic of each race have not yet been isolated does not obviate the possibility of real constitutional differences. The basic biological organization of each race should be studied more carefully, since neither sampling nor experimental conditions have been adequately controlled in this work.

The first of the psychological chapters reviews the work on differences in such elementary processes as reaction time and sensory acuity. No consistent differences in these functions have been found. Intelligence test studies, on the other hand, have often yielded large differences between certain race groups, but uncontrolled environmental and sampling conditions make it impossible to explain the results. Klineberg believes that the differences are due to environmental factors, although he admits that no crucial evidence is available on this point. Attempts to measure non-intellectual race differences have proved to be fruitless, since, as Klineberg points out, no valid

techniques for such measurement are available. With respect to the effects of race mixture, he fails to find any "proved advantages or disadvantages of hybridization". The two final chapters in the psychological division analyze racial statistics on crime and on mental disorders, but no distinctively racial differences can be demonstrated in either of these categories.

Klineberg next turns to cultural studies in the hope that they will provide data which can explain the obvious diversities in behavior found among people of different cultures. He tries to show that even such basic processes as the 'fundamental drives' and 'emotional expression' depend mainly on cultural conditions, since the behavior patterns characteristic of these processes vary so markedly with culture. It develops, however, that this daring proposition refers mainly to differences in adult behavior. The author, in a somewhat left-handed fashion, allocates to heredity about as much influence as most psychologists would care to claim. It is only by opposing certain extreme versions of hereditary causation, such as that of McDougall, that he is able to sustain his somewhat lengthy argument.

The chapters entitled "The Abnormal" and "Personality" constitute probably the weakest parts of the book. The essential thesis concerning 'the abnormal' is that a pattern of culture which is abnormal in one culture may be quite acceptable in another. This proposition would seem to be valid enough, as applied to taboos and analogous phenomena. But when the behavior of a Hindu mystic is compared to that of a schizophrenic patient, merely on the basis of similarity in posture, the argument become ridiculous. Homosexuality is cited as the best illustration of the author's point, but it certainly is debatable that homosexuality as such is a mental disorder. Klineberg recognizes the superficial character of many of the analogies cited in this chapter, but this awareness did not prevent him from reviewing them favorably and at length. The chapter on 'personality' is equally uncritical in the parts devoted to the interpretation of primitive cultures in terms of psychoanalytic theory. It is unfortunate that the author did not maintain, in his appraisal of this work, the same scientific attitude which dictated such a careful criticism of the speculations on 'constitutional types'.

The final chapter contains a summary of the writer's conclusions, and a statement of their implications for racial attitudes and relations. The negative results of the biological and psychological studies are asserted to have "very definite and positive implications". It develops that the implications have reference to the practical aspects

of interracial relations rather than to scientific generalization or hypothesis. Klineberg hopes that the absence of conclusive proof of the innate superiority of certain races may possibly lead to a more favorable attitude towards races usually regarded as inferior. One can scarcely take issue with a desire for better race relations, although the methods for securing them may not be as obvious as Klineberg thinks. It is doubtful that either positive or negative scientific results will exert a very strong influence on racial attitudes.

Klineberg believes in the basic psychological equality (and presumably similarity) of all races, and this is undoubtedly a tenable scientific hypothesis. But scientific proof of this hypothesis is definitely lacking, and it is unfortunate that Klineberg did not view the controversial material of his third section with the same critical eye which he used in evaluating the biological and psychological studies. Otherwise, the book is an excellent piece of work. It is both carefully organized and well written, and each chapter is followed by a very good bibliography. It is scarcely adequate praise to say that it is the best book yet written on race differences, since no other writer has really attempted to do anything so comprehensive.

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HOLLINGWORTH, H. L., *Psychology of the Audience.* New York: American Book Company, 1935. Pp. 232.

Hollingworth talks about his book as "an account of our more or less experimentally verifiable knowledge up to date, flavored with a mild touch of general psychological analysis". He has written of types of audiences, how to secure the attention of each, how to hold it, to impress it, to persuade, and direct it. In the discussion on persuading the audience the author suggests the advisability of making one's propositions desirable. Some of the fallacies of formal logic are mentioned. The inventory of the "average man" in the audience, with reference to size of vocabulary, education, occupation, intellect, etc., is illuminating and helpful.

We find from the various researches that majority opinion has a more pronounced effect than expert opinion; seats should be close for an intellectual attitude; reading a manuscript is less satisfactory; too many people on the platform distract the audience, etc. Actual tests show that the listeners to whom material has been freely delivered remember 36% more than an audience which has heard the matter read. Modern listeners prefer shorter sentences than did their ancestors. Those who have counted words in the old orations find

an average of 50 words to a sentence. Today the average is 25. A sentence should express a complete thought, of course, but the thought is usually better conveyed by dividing a complex one into units.

Writing with bold strokes Hollingworth comments on the audience of business men: "The myth about the hard-headed business man must follow Santa Claus, the stork, and rainbow's end. Rarely will facts stick in him. Suggestibility and mysticism find in him their best stronghold. He is content with tradition, opinion, authority, the sanction of prestige, and other forms of bluff."

From the standpoint of the psychologist the book is an attempt to gather up the scattered bits of experimental evidence which have some bearing on the subject and then to supplement or interpret these with some generalizations that are plausible on the basis of fundamental psychological theory. Eighty-five books or articles are mentioned in the bibliography. Many of the experiments cited hit the public speaking problem directly, but in some cases the analogy is rather farfetched. The general outline of the book follows somewhat the same pattern as the psychology of advertising, and it is especially interesting to note the close relationship. The chapters on "Impressing the Audience" and "Direct Action" are especially good.

The book is altogether fresh and readable. Hollingworth's counsel is practical and easily understood. He points toward more pleasing and effective discourse. It should be a very helpful book for students of public speaking, but it is hardly a significant contribution to psychological literature.

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LIGON, E. M., *The Psychology of Christian Personality.* New York: The Macmillan Company, 1935. Pp. xi+393.

The psychologist takes up a book thus entitled, already half-prejudiced. Repeated, disappointing experience tells him that such titles usually prove no contribution at all, either to psychological fact or psychological system. At best, they may consist of more or less uncritical applications of more or less relevant psychological generalizations; at worst, a dressing up of some subject matter in psychologese in the hope of making it sell. When, coupled with "Psychology of ———" are the words "Christian Personality", one's misery is heightened by visions of endless controversy over what distinguishes such from a personality that is not Christian; or else, of the dogmatic

adoption of some particular conception of Christian personality with no justification of its validity. So the reviewer undertakes his task in an unhappy mood, almost wishing that titles of this sort could somehow be *verboten.*

Perhaps this is too uncharitable a view to take of a book which explicitly disavows scientific pretensions. Its purpose and nature can be expressed, perhaps not unfairly, in the author's own words: "It is the aim of this book to interpret the teachings of Jesus in terms of modern psychology . . . with three groups especially in mind . . . Christian parents . . . ministers . . . Christian men and women everywhere. . . . It is not a scientific monograph. . . . I have endeavored deliberately to see if I could so interpret Jesus' teachings that they would be in accord with all we know of the psychology of personality . . . [Both in biblical exegesis and in psychological theory] where two theories stand side by side, with equally good evidence for both, the one in line with my theory has been chosen. . . . The Christian personality will be evaluated in terms of mental health and strong personality, using the principles of mental hygiene, psychiatry, and psychology. . . . Finally . . . how can it be developed?" (From Preface and Introduction.)

The author's acquaintance with contemporary psychology saves him from glaring blunders and pseudo-science that vitiate so many popularizations of psychology. At the same time it must be said that not all the psychological concepts employed appear to have been clearly thought through. "Instincts" are disavowed; but "inherited urges" are liberally utilized. "Measurement" and "experiment" are declared to be basic; but few or no significant, original, quantitative studies are cited, and the literature of personality measurement is represented mainly by qualitative generalizations. Ambiguous concepts,—"spiritual laws", "fatherly love" (as contrasted with brotherly love), "sublimation", etc.—leave one in doubt as to what is really intended.

On the other hand, some laymen may find its comments and illustrations suggestive and satisfying, just as they do a good sermon. (Is this book, in fact, anything more than a sermon series, with just a dash of psychological flavoring?) They may come to feel that there is no *necessary* contradiction between great truths of human experience expressed in classic religious terminology and the declarations of psychology about the same experiences. They may be enlightened by some of the warnings against pseudo-psychological shortcuts and promised miracles (such as the possibility of sudden recon-

structions of adult personality). Some psychologists might profitably learn from this book that modern religious education is not primarily concerned with teaching Bible verses, creeds, or ecclesiastical conformity, but with developing character, integrity, and happiness through the effective utilization of soundly devised techniques; and that religious leaders and workers are increasingly adopting this conception of its function.

But, is this "psychology"?

FORREST A. KINGSBURY.

The University of Chicago.

STRECKER, E. A., and EBAUGH, F. G., *Practical Clinical Psychiatry for Students and Practitioners.* (Fourth Edition.) Philadelphia: P. Blakiston's Son and Company, 1935. Pp. xviii+705.

Since psychology and psychiatry are running on parallel tracks with but all too little real effect upon each other, it is of interest for the psychologist to acquaint himself periodically with the changes taking place in the formulation of psychiatry. Any textbook for students represents a common denominator, sometimes high, sometimes low, of the present status of the field with which it is concerned. If the textbook is regarded by practitioners in the field as satisfactory and worth while, one may conclude that the author has expressed the thinking of his colleagues fairly accurately, and that probably he has formulated his material in a way which these colleagues have found stimulating. If a text runs through several editions, one must conclude that those working in the field have found the treatise of real significance and value. This work is now in its fourth edition, and has been widely used in medical schools and in the teaching of psychiatry in general. It seems that it is a fair representation of present day psychiatric thought.

The material is presented from the psychobiological point of view of Dr. Adolf Meyer, which is exemplified in psychology particularly by Yerkes and Dunlap. The first chapters are given over to the formulation of this viewpoint in a rather simple fashion. Essentially it is a middle-of-the-road statement of a basic philosophy and psychology necessary to understand the behavior of the mentally diseased. Actually, this formulation is not greatly different from that which one would find in the elementary text of psychology, except that to the psychologist it may seem odd or somewhat old-fashioned in its phraseology.

The remainder of the book is devoted to the systematic descrip-

tion, classification, and evaluation (diagnosis and prognosis) of those varieties of disease which are at present considered part of the field of psychiatry. There is an extreme diversity of material included here. We have descriptions of organic diseases and their attendant mental phenomena, all feeblemindedness, social maladjustments, traumatic injuries, psychopathic inferiority, and the behavior problems of children. Actually the concept that psychiatry deals principally with the psychoses (insanities) seems to have disappeared practically in the same way that the concept of psychology dealing with the problems of the mind seems to have disappeared. Through all of this widely diversified material runs the common thread of the reciprocal psychosomatic relationship. The thing which is in common between the disordered mentality of the Mongolian idiot and the paranoid patient is the disorder of mental life and its effect upon the physical status of the individual, or vice versa.

The contrast between psychology and psychiatry is brought out clearly in the material used to clothe the concepts presented. This text is largely made up of the descriptions of *individual cases* together with a discussion of etiology, diagnosis, prognosis, and therapy. Most present day texts on psychology are compilations of *experimental findings* presented in a more or less systematic fashion. We have, then, a contrast between clinical case histories and scientific experimental reports. This is essentially the basis of the differentiation in interests, viewpoint, and disputation between psychologists and psychiatrists. The psychiatrist is dealing with the individual patient and his present difficulties, trying to systematize and classify so far as possible these phenomena as he sees them. The psychologist neglects, for the most part, the individual and devotes his time and attention to the deriving of general proofs and demonstrations concerning the mental life of groups of individuals. The psychiatrist is unable to find very much of immediate value in the material which the psychologist provides for him. The psychologist usually finds it impossible to systematize accurately and adequately or deal with most of the formulations presented by psychiatry. That there should be a middle ground between these two positions is, of course, obvious, but the development of that middle ground is at present a no-man's-land subject to fire from either side.

The present volume is well written and interestingly presented. The authors have shown a great deal of skill in selecting their material, and organizing it in a systematic fashion. Unfortunately, the present edition is marked by an abundance of typographical errors

and minor mistakes. In any event, the psychologist wishing to acquaint himself with the present day status of psychiatry can certainly profit by the study of this volume.

CARNEY LANDIS.

New York Psychiatric Institute.

MORGAN, J. J. B., *Keeping a Sound Mind.* New York: The Macmillan Company, 1934. Pp. ix+440.

This book is presented frankly as a text for elementary courses in mental hygiene and makes no pretense at originality of theory or material. The author's point of view is that of a common-sense habit psychology with emphasis on social and emotional conflicts, a point of view which he has carefully and systematically elaborated elsewhere. The subject matter is conventional in content but is handled with a skill and verve that should make the book a highly successful text with elementary or freshman students. No space has been wasted on technical terminology or the entertaining but useless descriptions of psychoses which so frequently plague such texts. In essence Professor Morgan has written instructions to immature people on the methods they should use for developing a pleasing personality and a comfortable and happy life. If in places the term "Christian" seems to have been omitted only by sheerest force of will, one can scarcely criticize the mildly inspirational attitude which was adopted. What is characterized in our culture as a "sound mind" or a "good character" is essentially that code of behavior which has developed around Christian ethics. It is not surprising, therefore, that a text the purpose of which is to instruct students in the art of developing such characteristics should adopt an attitude which occasionally reminds one of the spirit of contemporary guidance organizations for young men and women. Aside from occasional language-mechanics, however, there is little resemblance between the two approaches. Professor Morgan depends on a generous fund of psychological sophistication and hard common sense to present a realistic and useful manual for developing a sound mind. Whether strong habit systems and emotionally toned self-evaluations can be remodeled by this sort of vicarious experience of the "experience of living" may seem an open question to some, but the author is probably correct when he says "it is just about as easy to form the beneficial habits as it is to fall victim to the detrimental habits if the person involved can be given a clear conception of their relative significance". *Keep-*

ing a Sound Mind should prove an eminently satisfactory guide to the formation of new social habits and outlooks.

ROBERT R. SEARS.

University of Illinois.

BANISTER, H., *Psychology and Health.* New York: The Macmillan Company, 1935. Pp. viii+256.

As the title indicates, Dr. Banister has written a textbook of medical psychology primarily directed to the medical student. The systematic position adopted is what may best be described as vaguely English. Little or no consideration is given habit formation as such, while heavy emphasis is laid on the development of sentiments, complexes, and character in the tradition of McDougall and Shand. The contents range from a discussion of normal emotional development and the trials and tribulations of the psychologically healthy person to a brief examination of the psychoneuroses and the various psychoanalytic theories. The last 3 chapters are devoted to the rudiments of treatment.

Although one finds little with which to quarrel so long as Banister's major systematic tenets are accepted, American readers will probably find the book less satisfying than a comparable text written by Morgan, Wells, or Dr. Leta Hollingworth. The author's opening thesis, that medical students must know psychological theory and be able to apply mild psychotherapy, will certainly find sympathy, but the time is coming when the English "human nature" psychology must be laid against the ruler of experimental examination along with the American habit psychology. Psychologists have demanded entrance to the medical curriculum for decades and yet so far have depended largely on theoretical psychology for their material. The argument that psychology is comparable to physiology fades into a mere wish when such a book as Banister's is compared to a standard text on physiology which is built around solid experiments. Current experimental psychology is unquestionably of value to medicine, but not in as direct a way as experimental physiology. The physician must deal with larger units of behavior than the conditioned reflex or the learning of nonsense materials. He must, therefore, be taught experimental psychology which deals with these larger units and be given principles which are derived directly from experiments and not simply reasoned out as analogues to the principles found to operate in the smaller units of behavior. Thus it is to be hoped that the psychologist will eventually be able to forego the luxury of saying,

e.g. that some phobias are conditioned responses or that temper tantrums are *learned* by trial and error, and will be able to point to experiments which demonstrate these relationships directly.

If psychology is to contribute to the physician's training, then, it must be experimental, *i.e.* comparable to other medical sciences. And it is against this laboratory criterion that such a book as Banister's must be placed. It seems possible that in the future the American habit psychology may measure up better against this criterion than will the English system with its emphasis on sentiments and character.

ROBERT R. SEARS.

University of Illinois.

WILE, IRA S., *Handedness: Right and Left.* Boston: Lothrop, Lee and Shepard Company, 1934. Pp. xiii+439.

One would have thought that all that could be written on this subject might be contained within the compass of a few pages. But after reading Dr. Wile's interesting book this opinion will be entirely revised. It contains an index with references ranging from "Abnormality" to "Zoroaster" and several hundred citations from authorities, anthropological and otherwise; hence there is no doubt of its comprehensiveness.

For the most part the author's discussion concerns the interesting and puzzling question as to how the right hand preference became so generally established in mankind. Of this fact there is no doubt, though estimates of incidence of left-handedness vary from 1% to 30%, according to the method of judging hand dominance. It should be noted that Wile's own estimate is 25% to 30%. He regards sinistrality as being probably a Mendelian recessive character.

The author thinks that there is good reason to assume that man originally possessed bilateral balance and that hand preference came about after the upper limbs were set free from locomotion. From many sources he presents evidence that men in the old Stone Age were ambidextrous and that among primitive people today there are relatively more left-handed individuals than among the civilized. In order to substantiate this view he makes a very complete survey of the anthropological literature.

In this respect the reviewer's experience tends to confirm Wile's view. Out of 60 adult Australian aboriginal males, 43% were stronger in the right hand, 23% in the left, and 17% had equal strength in both hands. Forty-five per cent had less than 3 kilograms

difference in strength of grip in either hand. Sixty per cent of South African Bushmen examined were stronger in the right hand, and 28% in the left. The Bantu of South Africa, however, appear to be dominantly left-handed, as far as strength of grip is concerned, no less than 61% of 116 adult males having better dynamometer records with the left hand.

Wile sets forth and discusses the various theories that have been advanced to account for right hand preference. These may be summarized as follows:

(1) *Warfare.* Primitive man noticed that wounds on the left side were more frequently fatal. The left hand, therefore, became the shield hand, the right being reserved for holding the weapon. Left-handed men were at a disadvantage and thus natural selection came into operation. This theory is severely criticized by Dwight.

(2) *Sun worship.* Man in the northern hemisphere faced the sun at rising and had it on his right hand throughout the day. In sun worship, therefore, the right hand became the symbol of fructification, rectitude, or right living. The left, on the other hand, became connected with all things sinister and dangerous. This orientation would, of course, be reversed in the southern hemisphere where the sun's course would be on the left hand of the individual facing the east. Wile attaches considerable importance to the influence of sun worship. In the reviewer's opinion right-handed preference probably came about before the setting up of such ideas in the minds of primitive men.

(3) *Cerebral dominance.* The greater size of the left side of the brain causes right-handed dominance. This theory, however, leaves us with the necessity of explaining how this cerebral disproportion came about.

(4) *Deflection to the right through diurnal rotation of the earth, causing heliocentric tendency in man.* Here again the conditions would be reversed in the southern hemisphere, tending to left-handedness more than right. Wile, however, believes that left-handedness is much more common in the southern hemisphere.

The reviewer would suggest another theory, *viz.*, causation may possibly be related to the close association in the brain of the speech and hand centers so that radiations from the excitation of the former tended to bring about excessive activity of the latter. Speech and right-handed gesture, therefore, are intimately connected.

If any of these theories can be successfully evoked to account for the initial tendency to unilateral dominance, then social pressure would reënforce the natural tendency.

For psychologists Dr. Wile's conclusions as to the dangers of attempting to convert sinistrals into right-handers will be of much interest. He says that the mandatory social attack upon a left-handed child forces an unnatural functioning of the nervous system and may produce or aggravate an internal stress that is released only through stammering, irritability, neurosis, or delinquency.

Whether or not the reader is convinced that any of the theories of the causation of right-handed dominance is adequate, he will find that the book deals with an interesting subject in a most fascinating way.

S. D. PORTEUS.

University of Hawaii.

BLUEMEL, C. S., *Stammering and Allied Disorders.* New York: The Macmillan Company, 1935. Pp. vi+182.

After devoting 40% of the book to a very lucid and interesting account of the experimental work on the conditioned reflex and inhibition, the theory is proposed that speech is a form of conditioned reaction and that stammering results from partial or intermittent inhibition. In "primary" stammering the inhibition is due to some simple but powerful stimulus. Such stammering is cured with relative ease. In "secondary" stammering the inhibition becomes complicated by associative conditioning and is characterized by conflicts resulting from various speech situations such as specific words, letters, persons, or social setting. In either case the correction of stammering comprises either the reinforcement of the primary speech function so that the inhibition will be overpowered, or the utilization of the process of unconditioning. Illustrations from the laboratory and clinic are used very effectively to make the author's meaning clear.

Other theories of stammering are severely criticized and the attempt is made to show that the only valuable parts of these theories are those which might be explained on the basis of the inhibition of normal speech.

The writer makes out a good case for his theory, his arguments are cogent, his illustrations are always relevant and illuminating, and many of his criticisms of other theories are incisive and convincing. Whether his theory stands the test of time or not, his presentation of it leaves the reader with a feeling of reality and it is certainly free from the mystical aura which surrounds so much of the discussion one encounters in the literature on stammering.

JOHN J. B. MORGAN.

Northwestern University.

BUSWELL, G. T., *How People Look at Pictures.* Chicago: University of Chicago Press, 1935. Pp. xvi+198.

In many situations movements of the eyes are supposed either to influence strongly the form of perception or to be well integrated into the perceptual behavior. In this book, which is the report of a major experimental investigation, is given a description of oculomotor behavior which occurs in viewing various kinds of pictures. Photographic records obtained while the subjects looked at the pictures furnished an objective measure of the eye movements employed. It is well known that "eye movements are unconscious adjustments to the demands of attention during a visual experience". A consideration of the eye-movement patterns found in the photographic records should, therefore, reveal to some degree the nature of the perceptual processes involved. Furthermore, these objective patterns of perception may be compared with the various hypotheses (based upon introspective evidence) regarding the part played by eye movements in viewing pictures.

Both children and adults were subjects in the experiment, 200 in all. They were asked to look at the pictures as if they were selecting one of them for their own. The locations of eye fixations were plotted on faint prints of the pictures viewed. It was found that the first few fixations were employed for a general survey. These were followed by a series of fixations concentrated upon relatively small areas of the picture. These plots, when combined, reveal for most pictures a converging of fixations about definite areas of interest which may be termed the centers of attention. There were, of course, individual differences in centers of interest which were obscured in the combined plots. In fact the individual differences in perceptional processes, as revealed by variation in the eye-movement patterns, were more striking than the likenesses.

In certain pictures where the trend of contours is definitely vertical, horizontal or in clearly defined curves as in a single ocean wave, there was a general following of the contours by the eye movements. Frequently, however, the direction of these movements was opposite to that indicated by the hypotheses found in books on art.

As a subject continued to look at a picture the duration of his successive fixations tended to become longer. Apparently the fixations of shorter duration were in general related to the simpler processes of visual perception while the longer fixations characterized moments of reflection on examination of details motivated by interest.

Other findings indicated that: (1) color had only a small effect upon the pattern of fixations in examining a picture; (2) the pattern of eye fixations does not resemble even remotely the general pattern in a picture; (3) art students tended to make shorter fixations than those without art training; (4) there was little difference between children and adults in oculomotor behavior while viewing pictures; and (5) eye-fixation patterns were markedly influenced by directions to the observer.

The author disclaims any special knowledge of art and further warns that the data presented do not necessarily characterize any particular type of artistic interpretation. There are, however, certain distinct contributions in the report: (1) It is apparent that eye movements are objective symptoms of the perceptional processes of the individual looking at a picture. The results make necessary some rethinking on the psychology of perception in this situation. (2) There is in the data much additional evidence to support the view that patterns of eye movements in a visual situation appear in their characteristic forms largely because of central processes of perception, assimilation, and the like.

The reader will wish that the author had given a fuller description of his method, especially the manner in which the subjects went at their task. To have them look at a picture in "their normal manner, whatever that was", and to find that some signaled for the next picture after 40 fixations while others employed 4 to 6 times that number, leaves the reader with some doubt concerning the validity of certain apparent group trends in the data. There is, however, little to criticize and much to praise in the study. It is a noteworthy contribution to the psychology of perception in the field of art. The author has been constrained in his conclusions while pointing out the many suggestive trends in his data. Art students and psychologists will find the book well worth their serious consideration.

MILES A. TINKER.

University of Minnesota.

DALE, EDGAR, *The Content of Motion Pictures. Children's Attendance at Motion Pictures.* New York: The Macmillan Company, 1935. Pp. xv+234 and ix+81.

The purpose of the first of these 2 studies, *The Content of Motion Pictures,* is to devise a method for analyzing the content of motion pictures and to apply this technique to a representative sample of motion picture output. Content is defined as "a verbal description

of what competent observers say has occurred on the motion picture screen". Efficiency of observation was increased for 115 pictures by a previous reading of reviews, and for 40 of these pictures by a preceding study of dialogue scripts. The major classifications discussed in individual chapters concern: general themes (based on 1,500 pictures, 500 from each of the years 1920, 1925, and 1930); locales and settings; economic status, age, occupation, and nationality of leading characters; clothing worn by leading characters; circumstances of meeting and love making; sex, marriage, and romantic love; crime; vulgarity; the goals sought by the leading characters; and the content of newsreels. Detailed analyses of these classifications are given in 53 tables. The most important conclusion concerning these data, in the opinion of the author, is the fact that in large measure the characters, the problems, and the settings are remote from the lives of the persons who view them. The author points out that the presented data can be interpreted only in the light of other investigations dealing with actual reactions of children and youth to varying motion picture content.

The aim of the second study, *Attendance at Motion Pictures,* was to discover the frequency of attendance of school children at commercial motion pictures in relation to age, sex, companions, time of day, day of attendance, and program offering most frequently viewed. The investigation was conducted during the year 1929–1930 using a large group of Ohio school children, chiefly between the ages of 8 and 19, with some data concerning ages 5 to 7. A further study was made of the age composition of a representative sample of the motion picture audiences in Columbus, Ohio.

Norms for motion picture content and children's attendance evolved in these studies may prove of practical value to investigators along similar lines. These studies show that, while children and youth actually constitute a significant percentage of the audience, motion picture content in general seems to be unsuitable for them. Both researches were carried out under the auspices of the Payne Fund.

F. H. Ehrenfest.

Harvard University.

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DWELSHAUVERS, G., *L'exercice de la volonté.* Paris: Payot, 106 Boulevard St.-Germain, 1935. Pp. 252.

FOCHT, M., *What Is Gestalt-Theory?* New York: George Grady Press, 1935. Pp. viii+122.

LORTAL, R., *Morale sociale générale. Éléments de théologie morale sociale, I.* Paris: Pierre Téqui, 82 Rue Bonaparte, 1935. Pp. vii+203.

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MARITAIN, J., *La philosophie de la nature. Essai critique sur ses frontières et son objet.* Paris: Pierre Téqui, 82 Rue Bonaparte, 1935. Pp. 146.

Programs Announcing Candidates for Higher Degrees, February, June, July and August, 1935. University of Iowa Studies, Series on Aims and Progress of Research, No. 48. Iowa City: University of Iowa, 1935.

ROBACK, A. A., *Improving Your Personality.* Cambridge: Sci Art Publishers, 1935. Pp. 40.

WILSON, F. T., *Guiding Our Children.* New York: Globe Book Company, 1935. Pp. iv+248+3.

A SYMPOSIUM ON CONVERGENT TRENDS IN PSYCHOLOGY HELD AT THE UNIVERSITY OF SOUTHERN CALIFORNIA

A symposium on convergent trends in psychology was held under the leadership of Dr. Milton Metfessel in Los Angeles on November 22 and 23, 1935, in connection with the celebration of the twenty-fifth anniversary of the inauguration of graduate studies at the University of Southern California. Dean Carl E. Seashore of the University of Iowa presided at the psychological sessions. Similar group conferences in 8 other fields of university work were held simultaneously.

The following papers were presented: Edward C. Tolman, University of California, *Operational Behaviorism and Current Trends in Psychology;* Edwin R. Guthrie, University of Washington, *Scientific Principles and Scientific Truth;* Warner Brown, University of California, *Facing the Facts;* Egon Brunswik, University of Vienna, *Psychology in Terms of Objects;* Robert H. Seashore, University of Southern California; *The Rôle of 'Schools' or 'Systems' in the Development of Psychology;* Calvin P. Stone, Stanford University, *Co-Relation as Method in Comparative Psychology;* Harold E. Jones, University of California, *Convergent Trends in Psychology and Related Sciences.*

The papers, which were presented in two sessions, were followed by panel discussion. The participants included the speakers and Paul R. Farnsworth, Stanford University, J. A. Gengerelli, University of California at Los Angeles, Ernest R. Hilgard, Stanford University, and Mary Brooks Eyre, Scripps College.

Tolman presented a schema which illustrated how the various chapters of contemporary psychology concern themselves with different postulated intervening variables between the independent variables (environmental stimuli, physiological drive, heredity, previous training, age or maturity), and the final dependent variable (behavior) actually studied in the laboratory.

According to Guthrie, scientific principles are a series of 'noises' or 'signs' which can be communicated. They are tools and not ultimate truths. Contributions are being made by different schools; these contributions are real additions to our ability to predict and control the class of events we call mental.

Brown objected to the widely accepted dictum that it is the business of science to predict and to control. The first business of science is to get at

facts; *i.e.* to know something. Psychological facts must be verifiable, and demonstrable under a variety of conditions.

Brunswik indicated the hypothetical nature of perception by calling attention to the difference between the projective size of objects, determined by the visual angle, and the independent or body size, determined by measurement apart from the position of the perceiving person. The usual intention is to attain the body size, independent of the stimulus projection. The actual attainment is a compromise between object and projective size.

R. H. Seashore pointed out that 'schools' represent a division of labor in psychology, and that they thus contribute to research.

Stone used the term 'co-relation' to refer to the researchers' methods of relating animal behavior to structural mechanisms, humoral mechanisms, homeostatic processes, and to special objects, situations, and relationships of the external world. This has been the fact-finding method par excellence in comparative psychology.

Jones considered the possibilities for more coöperative research cutting across the fields of several related sciences. Coöperation seems to be more highly developed in other life sciences than in psychology, as judged by the number of multiple author titles appearing in scientific journals.

At the general convocation on November 23, the degree of Doctor of Science was conferred upon Dean Seashore. The citation was made by his son, Robert H. Seashore, who is visiting professor of psychology at the University of Southern California.

ERNEST R. HILGARD.

Stanford University.

NOTES AND NEWS

PROFESSOR EDWARD S. ROBINSON of Yale University will deliver a Stafford Little lecture at Princeton University on February 10. His title will be *Psychology and the Law.*

THE COMMITTEE ON GRANTS-IN-AID of the National Research Council will hold its next meeting in March, 1936. Applications for grants to be considered at this meeting must be on file with the Secretary of the Committee, Dr. Clarence J. West, not later than February 15.

Educational Abstracts, a bimonthly journal under the editorship of Norman J. Powell, published its first issue in January. The purpose of the new journal is to provide abstracts of current publications of educational interest. Each issue will contain about eighty pages, and the subscription price is to be $4.00 per annum.

THE thirteenth annual meeting of the American Orthopsychiatric Association will be held at the Statler Hotel in Cleveland, Ohio, February 20, 21, and 22, 1936. Dr. Henry C. Schumacher is chairman of the arrangements.

THE INTER-SOCIETY COLOR COUNCIL will hold its annual meeting on Thursday, February 20, 1936, at 7:30 P.M. in the Astor Gallery of the Waldorf-Astoria Hotel, New York City.

Following a brief but important business meeting, *the conference will be open to the members of the organizations that are members of or affiliated with the Council.* At this meeting, which will be at 8:00 P.M., the Council will sponsor three lectures on color by representatives of the International Printing Ink Corporation and the Massachusetts Institute of Technology. These lectures have been given before a number of organizations and have been enthusiastically acclaimed by those who have been present. They include: *The Chemistry of Color,* by Dr. A. E. Gessler (I. P. I.); *Color as Light,* by Dr. A. C. Hardy (M. I. T.); *Color in Use,* by George Welp (I. P. I.).

Since these lectures have earned an excellent reputation it is possible that the attendance may exceed the capacity (400) of the Astor Gallery. Those reading this notice and secretaries of organizations interested, should notify R. G. MacDonald, Secretary of the Inter-Society Color Council, 122 E. 42nd Street, New York, as soon as possible, of their intention to attend. If the number of reservations exceeds the capacity of the meeting room, tickets will be distributed to first ones who notify the Secretary.